A RESEARCH DISCREPANCY MODEL FOR BUILDING TRADES TRAINING PROGRAMS

By

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Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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By

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The purpose of this study was to develop a research model to determine the variables influencing the discrepancy between the low placement of postsecondary building trades training programs graduates and the high demand for skilled craftsmen in the construction industry. The study was based on an investigation of the carpentry craft in Florida and the Provus Discrepancy Evaluation model.

Two instruments were developed through a series of meetings and personal interviews. One instrument was mailed to 1079 contractors representing four major construction groups that hire carpenters. The second instrument was sent to all 31 postsecondary carpentry

training program coordinators in Florida. Responses were received from 281 construction contractors (26%) and all 31 coordinators (100%). Six groups of research questions were answered to determine the significance of each variable on the supply/demand discrepancy.

The Wilcoxon-rank-sum test indicated no significant difference ($p<.05$) in placement procedures between high and low placement rate carpentry programs. Multivariate analysis of variance utilizing the Wilks' lambda criterion with post-hoc univariate comparisons using the Student-Newmans-Keuls test indicated significant differences in the perception of skills necessary for a skilled carpenter between the contractor group and the postsecondary training program coordinator group. Repeated measures one-way analysis of variance with post-hoc comparisons utilizing Fisher's LSD and Duncan's multiple range test indicated that contractors ranked community colleges as the least effective source supplying carpenters and as having a remote level of communication with industry. Formal meetings of the two groups was rated as the best method to improve communication. Program coordinators indicated that 23% of the graduates chose an alternative occupation; this was mainly attributed to low wages.

Utilizing the Malcolm Provus Discrepancy Evaluation model, the variables determined most significant were incorporated into a research discrepancy model. The model

in which the resources of the vocational education system were coordinated with the needs of the construction industry was recommended as the base for future studies of related building trades training programs.

CHAPTER I

INTRODUCTION

The United States Department of Labor (1980) has forecast that 2.4 million new construction tradesmen will be needed by the end of the decade: 900,000 to fill new jobs and 1.5 million to replace retirees and those who shift into other lines of work. In October, 1985, after examining the supply of skilled tradesmen nationally, the Construction Labor Research Council (CLRC, 1985) declared:

> It is estimated that replacement needs will result in annual requirements for at least 180,000 new workers to enter the construction industry over the next 5 to 10 years. This is about six percent of all construction workers. Of these, about 114,000 are skilled craftsmen. The aging of the construction work force over this period is likely to mean that these estimates will be too low by the mid-1990s.(p. 8)

As one of the nation's largest industries, the sheer size of the construction industry means that it has numerous requirements for new workers. Even under the pessimistic, and probably unrealistic, assumption of no growth, more workers will be needed by the construction industry than by any of the most glamorous technology fields. Computer hardware- and software-related industries

have been projected to grow about 50% more rapidly than construction, but construction will generate three times as many jobs as the computer field (CLRC, 1985). National construction training programs have been turning out an average of only 50,000 tradesmen annually (Business Round Table, 1983c). At this rate there could be a shortage of 1.9 million construction tradesmen by the year 1990. Dunbar (1988) declared, "The construction industry is facing the most serious skilled labor shortage in the nation's history" (p. 28). According to projections by the U.S Department of Labor (1986) the annual need for new construction workers from 1990-1995 will be 263,000 workers. Another study project published by the Business Round Table (1983a) on the construction industry's cost effectiveness contained recommendations that efforts should be made to create a formal group in each state to improve communication between construction leaders and vocational education officials in order to try to combat this shortage.

The consensus of current labor market researchers and general contractors throughout the nation has been that the construction industry has and will continue to experience a serious labor shortage in several crafts. This skilled manpower shortage continues very acute in Florida where construction activity has been fueled by the state's high economic and population growth.

According to U.S Census Bureau forecasting, the population of Florida will increase from its 1986 level of 11,650,000 to 14,765,821 by the year 2000 (Florida Statistical Abstract, 1986, p. 21). These figures indicate that Florida will grow four times faster than the nation as a whole and become the third most populous state, after California and Texas. To accommodate this growth, there will be greatly increased construction activity which will lead to the creation of many new jobs.

Writing in the Engineering News Record (ENR), Setzer (1986) reported that contractors in large areas of the Southeast are searching for skilled workers with no relief in sight. Robert F. Kidder, president of the Associated Builders and Contractors of Florida, Inc., was quoted as stating that labor shortages have created "tremendous scheduling problems--nothing is getting done on time" (p. 11). Many contractors have been paying workers extensive overtime to make up for the shortage of skilled workers. This shortage will become even more severe with the continuation of construction of the $1.2 billion Trident submarine base in Southern Georgia which will require thousands of skilled construction tradesmen over the next 10 years (1987-1997). Furthermore, the expansion at Walt Disney World will be expected to aggravate the shortage in Central Florida where Disney officials plan $500 million in large new projects (Issac, 1986).

The major objectives of vocational education have been to provide graduates with marketable skills and place them in jobs for which they have been trained. There is, however, a dichotomy between the demand for construction craftsmen and the placement rate of graduates of construction training programs in community colleges and vocational-technical centers. The most recent data obtained from the Florida Department of Education in Tallahassee on placement and follow-up indicated that graduates of postsecondary building trades programs experienced low employment rates in the fields for which they were trained for the academic years 1984-85 and 1985-86. Furthermore, several programs either closed down completely or operated well below the capacity of the training programs (Florida Department of Education, 1986, 1987).

In times of general labor surplus, such as in a recession, most building trades programs would be expected to have a low placement rate for their graduates. However, in times of high economic activity, such as was the case in 1987 in Florida, labor shortages occurred, particularly of skilled craftsman. In such a situation, construction craftsmen training programs would be expected to have high employment rates. However, in Florida, graduates have not been getting placed in employment related to their training despite the increasing demand for construction craftsmen.

More construction craftsmen need to be trained to meet the needs of the construction industry to avert an

increasing skilled manpower shortage. A methodology to study and investigate each craft is needed to explain the labor market disequilibrium and to explain the discrepancy between the high demand and low placement of construction craftsmen from state-supported training programs.

In the present study, a craft was chosen for investigation to serve as a basis for developing a research methodology leading to a model that could be applicable to other construction crafts. The carpentry trade, which represented the largest group of skilled craftsmen in Florida, was the study vehicle for this research. Nationally, almost 40% of the future need for skilled tradesmen will be in carpentry (CLRC, 1985). The U.S. Department of Labor (1986) in its Occupational Outlook Handbook forecast that the employment of carpenters was expected to increase as fast as the average of all occupations through the mid-1990s, which translates to an 11% increase in employment or an additional 101,000 carpenters by 1995. However, data from the Florida Department of Education indicate that enrollment in the job preparatory program, residential and commercial carpentry, has dropped dramatically in the last 2 years (1985-1987) reflecting a 40% decrease. Further, placement data for 1985-1986 and 1986-1987 have indicated low placement of the few graduates of residential and commercial carpentry programs (Florida Department of Education, 1987).

Purpose and Overview of the Study

The purpose of this study was to develop a model to determine the variables influencing the discrepancy between the low placement of postsecondary building trades training program graduates and the high industry demand for skilled craftsmen.

The study was conducted in four phases:

Phase I

A series of meetings and personal interviews were made with personnel from the Florida Department of Education and representatives of the major construction trade associations. A detailed explanation of the study and its benefits was presented. The interviews provided a focus for the problem and a thorough understanding of the key individuals and organizations in the study.

Phase II

A research methodology was developed to investigate postsecondary building trades training programs in one construction craft. Based on the craft of carpentry, two instruments were developed that combined input from the interviews conducted in Phase I.

Phase III

The analysis of data obtained from the two survey instruments developed in Phase II was designed to answer the following six groups of research questions:

1. Is there a significant difference ($p<.05$) between coordinators of carpentry programs with a high placement

rate and those of carpentry programs with a low placement rate in their ranking of factors influencing placement of graduates in jobs related to their training? Without regard to placement rate, how do the coordinators rank the factors?

2. Is there a significant difference ($p<.05$) between practitioners in the construction industry and vocational educators in their perception of skills necessary for a skilled carpenter?

3. How do construction contractors rate the Florida Department of Education training programs compared to other training sources?

4. What level of communication is there between carpentry training program personnel supplying carpenters and contractors in the industry that hire carpenters and how could this be improved?

5. What is the percent of graduates who are reported as seeking an alternative occupation upon completion of a training program? What are the reported reasons for the graduates choosing not to enter the carpentry trade?

6. What is the average wage rate for a journeyman carpenter? Is there a difference among contractors operating in Florida's five economic regions with respect to the wages they pay skilled carpenters?

Phase IV

Based on the concept of Malcolm Provus's Discrepancy Evaluation model, the variables determined most significant

were incorporated into a research model to be used to analyze the discrepancy between the low placement of building trades training program graduates and the high industry demand for skilled craftsmen in any construction craft.

Rationale for the Study

The inability of the leaders of a vocational program to place graduates in jobs related to their training is not necessarily an indication that the program has been ineffective. However, a low placement rate when demand is high does signal the existence of a problem. A low placement rate may indicate that students are not properly trained to meet the needs of the industry, that the institutions that house the training programs lack placement resources, that the graduates are choosing an alternative occupation, that supply exceeds demand, or that there is a lack of communication between personnel in the training institutions and the construction industry.

Placement

Placement statistics often are used as measures for evaluating the effectiveness of vocational-technical programs. The major objectives of vocational education have been to provide graduates with marketable skills and place them in jobs for which they have been trained. In addition to being a goal, job placement has played a significant role in the development of vocational legislation and the evaluation of vocational technical

programs. In Florida, effective with the 1984-1985 school year, any job preparatory vocational program in which the placement rate for persons completing the program has been less than 70% for any given year is automatically reviewed by the Florida Department of Education. Furthermore, any vocational program in which the placement rate has been less than 70% for 3 consecutive years has been ineligible for future state funding. The first consecutive 3-year period consisted of the 1984-1985, 1985-1986, and 1986-1987 school years (Florida School Laws, 1985).

The purpose of the residential and commercial carpentry program offered in community colleges and vocational-technical centers across the State of Florida is to prepare students for employment as skilled carpenters. Some program coordinators have not only failed to achieve the minimum 70% placement rate (Florida Department of Education, 1987) set by legislation, but they also have not satisfied the construction industry's demand for skilled carpenters. This reduced placement rate has subsequently affected enrollment. A preliminary survey by the researcher of the postsecondary carpentry training programs showed a decrease in enrollment from 1086 to 594 in the past 3 years (1985-87), indicating a 45% drop. If this problem is not remedied immediately, it will threaten the survival of building trades programs in community colleges and vocational-technical centers.

Even though a literature review revealed numerous studies and reports dealing with placement rates, few dealt with factors which influence the placement of students. This limitation is mainly because researchers only recently have begun to shift their attention from dealing with placement rates and quality of placement services to factors which contribute to lower or higher rates of placement. Therefore, placement procedures used by postsecondary training programs were analyzed to determine the most effective procedures and to what extent they contributed to the discrepancy between the high demand and low placement of trainees.

The Construction Labor Market

Every market has buyers and sellers and the construction labor market is no exception. The employer is in the market to hire an individual with some predetermined level of competence and the job seeker (trainee) is in the market to obtain a job. In 1987, Florida construction contractors who were searching for any type of carpenter to hire were motivated by the need to produce more structures and buildings to accommodate the fast growth of the state. This need was consistent with the economic precept that the demand for a product, in this case skilled carpenters, is derived from the need for goods and services produced by that skilled carpenter. If the demand for a product or a service increases (i.e., contractors seek more skilled carpenters than are available) agencies responsible for

delivering the products or service will ordinarily try to meet this demand (i.e., training institutions will produce more carpenters). The end result is increased production of skilled carpenters to meet the existing demand; this provides a market equilibrium.

If state-supported training institution faculties are launching carpenters into the labor market, but they are not getting employed, then it may be that industry personnel are dissatisfied with the product and are using an alternative source to satisfy this need. The primary objective of vocational education programs is to train students for gainful employment. Therefore, a part of this investigation was to determine (a) what sources were used by general contractors in Florida to satisfy their demand, (b) how they rated graduates of community college and vocational training centers compared to other forms of training, and (c) whether community colleges and vocational training center personnel produced a carpenter with the skills needed by the construction industry.

Supply and Demand

Ehrenberg and Smith (1985), analyzing labor shortages, stated that the market demand curve (See Figure 1-1) indicates how many workers employers would want at various wage rates. The market supply curve indicates how many workers would enter the market at each wage level.

For example, suppose the wage for a skilled carpenter is set at W1. At this low wage, demand (as indicated by

the demand line or curve) is large but supply is small. More importantly, the graph indicates that at W1 demand exceeds supply. In this case carpenters may choose an alternative occupation. At this point, employers will be competing for the few carpenters in the market and a shortage of carpenters will exist. Employers wishing to attract more carpenters would increase their wage offers, thus driving up the overall level of wage offers in the market.

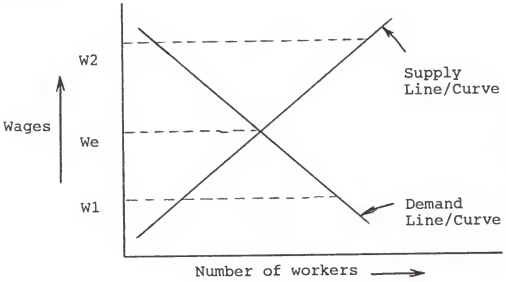


Figure 1-1 Supply demand model for a perfect labor market Source: Modern Labor Economics (p. 31) by Ehrenberg and Smith, 1985, Glenview, Ill: Scott, Foresman & Co. Copyright 1985 by publisher. Permission granted by publisher.

As wages rise, two things should happen. First, more carpenters should choose to enter the market and look for jobs (a movement upward along the supply curve); second, increasing wages should induce employers to seek fewer carpenters (a movement downward along the demand curve). If wages were to rise to W2, supply would exceed demand,

resulting in a surplus of carpenters. The lines in Figure 1-1 indicate that if wages are not raised, demand will continue to be high, but supply will be small. In this case carpenters will choose an alternative occupation causing a movement downward along the supply curve until wages rise. Freeman (1977) stated:

> The factors that influence choosing an occupation can be classified into two groups. Those inherent in the individual, such as preferences and abilities; and the wages and job characteristics that are determined by the market. The economic theory of choice assumes that within the constraints set by the market and by personal abilities, the individual selects the occupation that maximizes his utility function. (p. 2)

The wage rate at which demand equals supply is the point of equilibrium (We). At We there is no surplus and no shortage. All parties are satisfied; there is no discrepancy and the market is in equilibrium.

The example of a perfect labor market was incorporated to determine whether low wages caused graduates of carpentry training programs to seek an alternative occupation, thus contributing to the discrepancy between high demand and low placement of construction craftsmen. The labor market for skilled carpenters in this study was a market in metropolitan statistical areas that were related to the location of the respective chapters of the major trade associations. The geographic regions established for this study were the five metropolitan areas in Florida, which were in general congruence with the chapters of the major trade associations. Information related to this occupation

was believed to be valuable to vocational education program leaders in each area and to the individual trade associations in these geographic regions. For this reason the wage rate analysis was divided into five market regions in Florida, based on economic activity corresponding to the standard metropolitan statistical areas (see Appendix I).

Background and Significance

The cost of providing vocational education dictates the need for optimum use of resources. Bottoms (1983) stated "because the demand for vocational and technical education will increase faster than resources, the emphasis will be on making the maximum, most effective use of every resource" (p. 10). Each year as school officials prepare budgets, they are forced to scrutinize requests and strive for dollar efficiency. Programs which are ineffective or not meeting their goals are reduced or eliminated and instructors are dismissed in order to hold down operating costs.

Florida is in an enviable position of growth and economic development. Vocational education is an integral part of economic development and the Florida economic system. The economic base as it relates to business and industry should be supported by vocational education programs providing a well-trained work force in sufficient numbers to meet the needs of the economy.

Primarily because of poor quality of data and an apparent lack of incentive to use such data, vocational

educators have historically been accused of being unresponsive to labor market trends (Goldstein, 1983). Although providing training services has traditionally been part of the responsibilities of vocational educators, concerns for employment have not (Maurice, 1985). To maintain awareness of and remain responsive to the general requirements and conditions related to employment, administrators of training and employment services must acquire and apply pertinent labor market data. Unfortunately, the validity and use of labor market data have been a persistent problem in vocational education.

The work of Drewes and Bice (1981), in their national assessment of labor market data, revealed a consensus that the quality of data was questionable and the level of use of these data by planners of training programs was unsatisfactory. Plans are only as good as the market data analysis from which they were formulated. If the plan is faulty, then inefficiencies can result when delivering training programs.

The present research was intended to provide vocational educators with a methodology which would help them to research and efficiently utilize the vocational education system and coordinate with the needs of both union and non-union contractors in order to avert an increasing shortage of skilled manpower in the State of Florida and avoid the elimination of state supported-training programs.

Application of the stated methodology resulted a model which would determine the discrepancy between the low placement of postsecondary building trades training program graduates and the high industry demand for skilled craftsmen.

Limitations and Assumptions

Limitations

This research study was limited to

1. The job preparatory program, Residential and Commercial Carpentry CIP No. IN46.020100, as outlined in the Vocational Education Program Course Standards (Florida Division of Vocational, Adult, and Community Education, 1986).

2. Only postsecondary institutions in the State of Florida offering less than a baccalaureate level program were included in the study. High school vocational programs were excluded for this study.

3. This research involved the judgments of vocational educators and building contractors in the State of Florida. It did not include the opinions of the students either graduated or those still enrolled in these programs.

Assumptions

The following assumptions of this study should be recognized:

1. There was a supply/demand imbalance in the Florida labor market.

2. Administration and collection of the questionnaires did not influence the responses.

3. The respondents responded in an honest and accurate manner.

4. Responses accurately reflected actual practice.

Definitions of Terms

For the purpose of this study, the following definitions apply:

Apprenticeship is a structured system of training designed to prepare individuals for occupations in skilled trades and crafts. It combines on-the-job training under the supervision of experienced journeymen with related classroom instruction. Apprentices who successfully complete the prescribed number of hours of training in a registered apprenticeship program are awarded certificates of completion.

Construction contractors as used in this study, describes those engaged in the construction of buildings and/or structures categorized as residential, commercial, industrial, educational, and recreational.

Educators as used in this study, refers to those persons who were instructors or course coordinators of postsecondary carpentry training programs in Florida.

Equilibrium is the wage rate at which demand for workers equals the supply in that market. Employers can fill the number of openings they have and all employees who

want jobs in this market can find them. At this point there is no surplus or shortage.

Formal training is a structured and systematic sequence of in-class instruction for a predetermined length of time, with testing upon completion of the required curriculum.

Journeyman is a skilled craftsmen who has learned a handicraft or trade and is considered "skilled" as distinguished from an apprentice ("semi-skilled") and a master ("highly-skilled.")

Linkage is any arrangement among organizational personnel that requires mutual coordination or exchange of resources and activities.

Model ia a graphical description or analogy used to help visualize something that cannot be directly observed.

On-the-job training is the assignment of an unskilled worker to work with or under the immediate supervision of a skilled craftsmen in order to learn the skills of the craft.

Placement refers to a student in a job preparatory vocational program when he or she has become employed in an occupation requiring the use of the competencies acquired in his/her vocational program.

Residential and commercial carpentry is a program for the purpose of preparing students for employment as construction carpenters, maintenance carpenters, rough construction carpenters, and concrete form builders, or

providing supplemental training for persons previously or currently employed in these occupations. The content includes, but is not limited to, communication skills; human relations and employability skills; safe and efficient work practices; use and care of handtools, power tools, other equipment; selection, application, and care of materials; interpretation of blueprints and specifications; laying out, fabricating, erecting, installing, and repairing residential and commercial structures and fixtures using hand tools (Florida Division of Vocational, Adult, and Community, Education, 1986, pp. 797-804).

CHAPTER II

REVIEW OF THE LITERATURE

This review is organized into five major areas. In the first section a brief background on vocational education generally is presented. The second section is focused on literature related to the placement of students of postsecondary vocational education. In the third section the construction industry needs are described, and in the fourth the communication between education and industry personnel is addressed. The fifth section is focused on model development and examples of models that pertain to program evaluation.

Background

Vocational education came into prominence with the industrialization of society. Prior to the industrial age, occupational training was accomplished by a system of indenture, apprentice training, or the transmission of skills from parent to offspring.

> Oh at home had I but stayed
> Prenticed in my father's trade. (Houseman, 1908, p.96)

Back in the days when Alfred Houseman wrote these lines, many boys became apprentices because tradition

dictated that a trade be passed from father to son. Today, with industrialization, the growing demand for workers dictates the need for training workers on a large scale. This has resulted in the present system of vocational education, a product of years of experimentation and research, increasingly recognized as a vital aspect of American education.

The complex area of vocational education has undergone radical changes in the past two decades, many of which have been dictated in the United States by legislation such as the Carl D. Perkins Vocational Education Act of 1984 (P.L. 98-524). This act requires that vocational education leaders address the needs of adult learners, displaced workers, students with special needs, and minorities, as well as all mainstream students preparing to enter a multitude of occupations. The act stresses sex equity, a sound plan of evaluation, and reliable measures of accountability (Cobb & Kingsbury, 1985; Parks & Henderson, 1985; Terry, 1985).

The percentage of the American population enrolling in vocational education programs has grown in the past 20 years from 2.7% to 5.9%, reflecting job opportunities in a broad variety of occupations, including office careers, trade and industry, and health-related fields. The number of comprehensive vocational programs has increased by almost 300, and program categories grew from 100 in 1965 to more than 400 in 1983 (Bottoms & Copa, 1983). At the same

time, there has been concern expressed by the general public and business world leaders that vocational education seems plagued with unclear goals and the lack of a positive, consistent image. To further confound the situation, there are reports (Preskill, 1984) that vocational educators themselves agree that their field has no clear, concise philosophy from which to operate.

Although there is a concern and an increase in emphasis in the United States on vocational-technical education, many students are reluctant to enroll in these programs, be it carpentry or any other training program. Some students believe that enrolling in a vocational program implies that they cannot compete intellectually and academically with students who enter colleges and universities (Conner, 1986).

What people must recognize is that vocational education is as important as college education for the survival of the American economy in an age of rapidly increasing technology. John W. Gardner (1961), former United States Secretary of Health, Education, and Welfare, alluded to this when he observed that

> an excellent plumber is infinitely more admirable than an incompetent philosopher. The society which scorns excellence in plumbing, because plumbing is a humble activity, and tolerates shoddiness in philosophy, because it is an exalted activity, will have neither good plumbing nor good philosophy. Neither its pipes nor its theories will hold water. (p. 86)

Placement

Until the latter part of the 19th century, the responsibility of assisting youths to enter the world of work was borne by the family. By the turn of the century, the family lost its dominant role in placing its youth in employment, mainly as a result of the Industrial Revolution and its need for highly specialized workers (Kosmo, 1978).

The Smith-Hughes Act of 1917 was the first and perhaps most important of a series of legislative provisions for direct federal aid to secondary schools in the United States. Funds were given to local school districts to help pay as much as 50% of the instructional costs of high school programs for vocational education, including placement services for graduates.

The goal of vocational education has historically been to provide students with the knowledge and skills necessary for entry into the world of work. It is understandable that placement of students in jobs related to their field of training has been used as an accountability measure. As suggested by Richardson and McFadden (1977),

> since accountability measures the achievement of basic purposes, it is necessary to make judgments concerning effectiveness of vocational education by measuring its observable results. The success of graduates, the wages they earn, the number engaged in occupations for which they are trained . . . are the types of data that influence this judgment. (p. 1)

The emphasis on vocational education accountability during the 1970s contributed to the passage of the Educational Amendments of 1976, which have been viewed as a

major intervention by the federal government to make vocational education accountable for employment. The new requirement introduced by the 1976 legislation has required state leaders to be accountable for training-related placement and employer satisfaction.

Pucel (1973) pointed out that the ultimate purpose of an information system should be to determine whether programs are accomplishing organizational goals. He added that information on student output gives information on program effectiveness, and information on basic program elements may provide reasons why programs may or may not be effective.

Pucel addressed the issue of effectiveness as a rationale for placement and follow-up by citing four possible reasons for low effectiveness or efficiency:
(a) No need for the program to be offered in the first place. (b) Skills learned are not needed in the occupation or in the workplace. (c) Students admitted to the program cannot or do not want to effectively apply the content.
(d) Methods of presenting the content are not adequate.

Flannagan (1974), although writing from a rehabilitation counselor's perspective, appeared to identify, even within a public school setting, possible factors that might contribute to the overall level of job placement service operations. His position, supported later by Brown and Feit (1978), stated that counselors generally see their professional role to be that of

counseling, thereby excluding activities relevant to job placement. Flannagan then frankly stated that a counselor tends to stay removed from job placement functions and responsibilities due to "basic hatred . . . for any activity that forces him to come into contact with an alien public (employer)" (p. 180).

Brown and Feit (1978) agreed with Flannagan (1974) that most counselors lack the skills necessary to conduct job placement activities and services. Brown and Feit proposed that the very nature of most counselor education programs contributes directly to this void in skills through almost no emphasis on job placement during the formal professional training of counselors. Brown and Feit further identified an apparent lack of state departments of education leadership as contributing to the present status of job placement operations and emphasized a need for skill development training activities from the state as one means of improving job placement program operations. Brown and Feit also implied a direct relationship between local job placement operations and the availability of funds such as career education program grants and other funding from non local sources. Finally, pressures of time and job demands on instructors were identified as highly possible contributors to their lack of involvement in the schools' job placement efforts.

In their study at Indiana University, Mitchell and Gibson (1977) sought to identify factors that school job

placement programs found to be successful in meeting student needs. They concluded that the larger the school and community, the more likely the school was to offer job placement and follow-up services. The authors also offered recommendations derived from the study in terms of service components considered necessary for operating placement programs. Their listing of components included (a) establishment of a job placement advisory committee; (b) filing of student employment needs and employment opportunities; (c) establishment of a communications system to publicize job placement services and procedures to students, to employers, and to the community; and (d) follow-up and evaluation.

A major national study was conducted by Mckinney and Malasz-Salster (1981). They used both qualitative and quantitative data derived from a sample of vocational directors, vocational teachers, counselors, job placement specialists, local vocational education advisory committee members, current students, former students, parents of current students, parents of former students, and employers. Based on the findings of this study, high job placement existed in schools where school personnel had a clear understanding of the purposes of vocational training and a knowledge of the needs of business and industry, were enthusiastic and were committed to placing students, and the program curriculum was frequently revised on the basis of changing labor market information.

Several research projects and studies related to placement were conducted in Florida. The Florida State Advisory Council on Vocational and Technical Education (1984c) published the results of a project conducted by the Office of Institutional Research at Broward Community College. The purposes of the study were to identify exemplary practices in the use of placement and follow-up information and ways in which this information could be used to improve vocational education programs throughout Florida.

The authors surveyed persons designated responsible for placement and follow-up in all 28 community colleges and 67 school districts in Florida. Findings as a result of responses to a 17-item, mainly open-ended questionnaire were that

- Approximately half of the responding institution reported unclear procedures for the use of follow-up and placement information; just over one-third of the reporting institutions mentioned the existence of clearly defined goals and objectives;
- Just under half of the reporting institutions indicated that program changes have occurred as a result of placement and follow-up. Little attention has been paid to the establishment of standards for program changes;
- Internal communication of placement and follow-up results is not pervasive. Community colleges reporting formally communicated the results internally, while 46 percent of school districts reported doing so;
- Advisory committee involvement appears to be stronger in the school districts than in the community colleges; and
- Teacher and counselor involvement in the use of placement and follow-up information has been only limited or moderate in both school districts and community colleges. (p. 7)

Another study relating to follow-up was the 1982 study completed by the Florida Governor's Office of Planning and Budgeting (Polvika & Harrison, 1982). Although this study was not directed toward an in-depth analysis of placement or follow-up, it contained what is perhaps the most recent broad-based presentation of follow-up data in Florida.

Two accountability measures for assessing the effectiveness of vocational training programs, training-related employment rates and unemployment rates, were analyzed by the researchers. Available follow-up data from the Florida Division of Vocational Education and Community Colleges were used. General findings were as follows:

> Unemployment rates of community college completers for 1980 fell well below overall state unemployment figures.
> Unemployment rates of area vo-tech school completers for 1980 fell both above and below state unemployment rates. Most program clusters show higher rates of unemployment for 1980 program graduates than the overall state unemployment rates. (Polvika & Harrison, 1982, p. 22)

On the whole, and except for one of the program cluster areas, community colleges had better training-related placement and lower unemployment rates than area vocational technical centers.

A Florida State University researcher (Massoudi, 1984) determined factors that influenced the placement of 1982-1983 graduates of postsecondary machine shop programs in Florida was generally in agreement with the findings of other studies dealing with factors which have an impact on placement of vocational students. The quality of the

training and its relevance to the needs of local industry were found to be major positive factors in the placement process.

Even though this literature review revealed numerous studies and reports dealing with placement rates, few dealt with factors which influence placement in vocational education. This limitation was mainly due to the fact that researchers have only recently begun to shift their attention from dealing with placement rates and quality of placement services to factors which contribute to lower or higher rates of placement. Placement rates do not necessarily provide a valid measure of supply/demand ratios. They provide no information on situations in which there are high demands for occupational skills which are unfilled, but merely the successes or failures of students who were enrolled in those programs for that year are reported. However, placement rates do signal the existence of a problem. Vocational educators should be made aware of the existence of the problem along with suggestions for remediation.

The Construction Industry

The extensive changes in vocational education and its apparent lack of a consistent identity have had an impact on all vocational programs, in particular the construction trades training programs which formed the context of this study. Construction industry leaders realize that they would best be served by educated and trained personnel to

meet the ever-increasing demands of this rapidly changing technological age. Few industries have more diversified personnel requirements. The Associated General Contractors of America (AGC, 1986) stated that

> it is more than obvious that expanded training of manpower is one of construction's most pressing needs. The construction industry is in a constant state of change of equipment, materials, methods, and managerial techniques. It is absolutely essential that course content be revised as often as necessary to keep abreast of the industry's changing development. (p. 1)

Community colleges and the vocational education system leaders have every opportunity to design and implement beneficial programs to meet student, institutional, industrial, and societal needs in occupational education. To become more beneficial, these programs must be articulated with the respective industries' actual needs. Ahmann (1979) asserted that

> primary criteria for determining program success are the extent to which leavers and completers find employment in occupations related to their preparation and the extent to which they are considered prepared for employment by their employer. (p. 1)

In a research report on a project to investigate the training activities in the home building sector of the construction industry, Foster (1973) stated:

> In what appears to be a fairly typical pattern nation-wide in this sector of construction . . . skills are acquired (1) haphazardly on-the-job or (2) from other sources (including trade schools, community colleges, service schools run by material suppliers, or some experience in the unionized sector), leading to the conclusion that the preponderance of workers in the homebuilding industry are, at best, marginally skilled. (p. 31)

Project shortages of building trades personnel gave rise to a study (Dailey, 1964) at the University of Colorado which dealt with skill utilization in the home building industry and the implications for apprenticeship programs. It was determined that the 4-year periods of broad skill training were no longer necessary and that almost all on-site jobs were performed by tradesmen who are specialists in one particular area.

A more recent needs assessment study was conducted at the University of Northern Colorado (Devencey, 1982) to determine the needs and cognitive learning experiences deemed most necessary by professionals in the construction industry for a building trades graduate in carpentry and\or millworking (finish carpentry). A questionnaire was developed and sent to 108 contractors who were considered potential employers within a 4-county service area of Pueblo Community College, Colorado. Twenty-eight contractors responded.

Curriculum content and program modification were derived by analysis of ranked items and their position within the distribution. All ranked items falling below a 3.00 weighted average based on a 4.0 scale were analyzed as to their need and importance for program evaluation and revision. A competency-based model was developed and implemented at Pueblo Community College in the building trades program.

Devencey revealed a need for technically competent workers and suggested that external input should be sought from outside the school setting. "This need cannot be honestly validated by mere suggestion from the program-chosen advisory consultants. Validated need must derive from external sources" (Devencey, 1982, p. 104).

This investigation of available research revealed that a number of studies have been conducted throughout the United States dealing with the status of the building construction industry and the work force needed at different levels: management, engineers, technicians, and skilled labor. The research revealed very few studies directed at the trade of carpentry. However, the researchers did indicate that carpenters were not being trained in enough numbers and with the skills necessary to meet the industry's demand. They indicated that carpenters seemed to become increasingly specialized and yet the training program leaders were still stressing a broad area of training. Further, the researchers revealed that the apprenticeship programs were becoming obsolete and not utilized by the construction industry. Industry leaders are looking at another source of training to satisfy their manpower requirements. Vocational education planners are in an enviable position to structure the curriculum and training in line with the needs of the industry and be the main source supplying skilled tradesmen.

Communication: Vocational Education and Industry

The responsibility, obligation, and objective of vocational education programs in today's economic setting is to train students for gainful employment. There seems to be a lack of articulation between what is taught in building trades training programs and what the actual needs of the construction industry are. Business and industry groups whose perceptions of vocational education were analyzed agree that increased involvement of employers would improve the programs (Casterline, 1974; Davis, 1977; Lovelace & White, 1982; Nuntz & Russell, 1981; Redington, 1971; Schultz & Stronge, 1981)

Schultz and Stronge (1981) conducted a study to determine Florida's business and industry leaders awareness of vocational education programs, contact with the program, ratings of the program, job performance of completers, degrees of cooperation between business and industry and the vocational education system, and suggestions for improving cooperation. Respondents' most frequent suggestion for improvement was to increase industry involvement. They listed advantages obtained from increased involvement of industry in planning. These included better understanding of education by business, more cooperation in implementing training programs, and assistance with job placement after training.

There is a strong need to improve the quality of interaction between vocational education and industry.

Lovelace and White (1982) emphasized the concept of business and industry leaders involvement in the planning, implementation, and evaluation of vocational education programs. The following findings were reported in the study:

- The major problem with Florida's manpower supply, as indicated by 57% of the employers, is that workers are "untrained, or not trained adequately." Employers expressed concern that training was not provided to meet their needs and skilled workers were not available to meet their demand for trained labor. Lack of coordination among training and placement agencies was also cited as a problem.
- Fifty-six percent of the employers expressed a desire to develop linkages with public education. Many firms noted that they currently participate on local vocational advisory councils, maintain formal and informal contact with schools, and list job openings with the Florida State Employment Service.
- A frequent suggestion was that public education agencies establish a vehicle for assessing industry needs for and improving manpower (labor market demand) projections. Recommendations for further interaction between industry and education were stressed. (pp. 25-26)

Other reports in which linkages on the state level were discussed include the 1982 vocational education study (Polvika & Harrison, 1982) in which the authors declared that there were no formal linkages or agreements at the state level between the Florida Division of Vocational Education and Community Colleges and the business and industry community. The authors also stated that closer cooperation between vocational education and industry leaders depends on the willingness of the Florida Department of Labor to establish a better working relationship among its local apprenticeship representatives, union and non-union programs, and local education agencies.

Researchers in a Florida State Advisory Council on Vocational and Technical Education (1984b) study determined the degree to which effective linkages have been established between the public education sector and the private sector as perceived by business, industry, and labor representatives serving on state-level advisory groups. A survey questionnaire was mailed out to 207 representatives and a series of interviews were conducted. The conclusions placed a strong emphasis on communication. "There is a need to improve communications between state-level job training agencies and the advisory groups appointed to assist the agencies" (p. 27).

The large number of articles in journals and separate reports dealing with improving communication between education and industry reflects the burgeoning interest in industry involvement. Information that appears to give the broadest overview of communication between industry and education is that which presents the potential barriers and aids to a joint working relationship as well as the characteristics of successful partnership. Clark and Rinehart (1982) suggested the fundamental elements needed to overcome barriers were "hard work, careful attention to details, a sophisticated understanding of the two worlds . . . and contagious enthusiasm" (p. 10).

According to Sherman (1983) characteristics of good linkages includes a good, clear communication between key persons in industry and education to be achieved through

one key individual committed to the communication effort, who can effectively communicate with the essential parties on all sides, and who has a sense of what will generate success and what will fail. The initiation should be of a modest nature and must have the personal commitment of top leaders on all sides.

The literature indicated that there is a strong need to improve communications between industry and vocational education. Business and industry leaders want the vocational education programs to be more responsive in helping meet the industry's changing needs. Educators want to see more interest and participation on the part of industry leaders to help solve education's complex problems. However, more importantly, consistent successful communication between the construction industry and vocational building trades programs is apparently dependent on the commitment of the top leaders on both sides who can translate and interpret the needs and intentions of the two organizations and who will be rewarded for identifying common interests and mutually beneficial uses of resources between them.

Models

The development of a model to be used to link vocational education and the construction industry necessitated a review of literature for a systematic plan for model construction and a review of models that were constructed for similar situations.

A model developed for use in implementing strategies must be designed and used with an idea about the needs of the situation and the expected outcomes. Carvel,Carvel, Holzkamper and Vann (1980) concluded that five planning elements were needed in order for strategies to be effective. These were as follows:

1. Identification of the needs or problems to be resolved.
2. Goals and objectives must be set so that the identified needs/problems can be solved.
3. Strategies must be designed, which are based upon goals and objectives.
4. Implementation of strategies must occur in a planned and orderly manner.
5. Assessment of the effectiveness of each strategy or set of strategies must be initiated. The assessment should determine the extent to which the needs/problems have been resolved and the goals attained. (Carvel et al., 1980, p. 11)

A congruence-contingency model was developed by Robert Stake (1967) for evaluation of a given educational program. Stake listed within a matrix categories of information and data that an evaluator would need to collect antecedents--any condition existing prior to teaching and learning which may relate to outcomes, transactions--the succession of engagements which comprise the process of education, and outcomes--the products resulting from an educational experience.

The curriculum is evaluated based on antecedents, transactions, and congruence. Congruence is an identical match between what is intended and what is observed.

An evaluation methodology and model were presented by the Phi Delta Kappa National Study Committee on Evaluation

(Stufflebeam et al., 1971) of which Daniel Stufflebeam was chairman. This model is comparable to Stake's model. The model included four types of evaluation that are necessary in education: (a) context evaluation, which contributes to the definition of objectives; (b) input evaluation, which is necessary for decision making on matters of design; (c) process evaluation which guides decision making on operations; and (d) product evaluation, which provides data for judging attainments, and, hence, for revision, termination, or continuation of the program (p. 203).

The purpose of an evaluation should serve at least three major objectives: (a) to ensure the quality of the product, (b) to ensure this quality at minimal cost, and (c) to help management make decisions about what should be produced and how. Quality control requires the establishment of procedures to monitor and modify programs to ensure uniform products that meet acceptable standards (Provus, 1971, p. 12). Based on these objectives Provus's Discrepancy Evaluation model is designed to measure program performance data with a standard. If a discrepancy occurs, Provus pointed out that such a discrepancy requires the program planner to revise, modify, or terminate the program.

A linkage model between industry and agricultural education was developed by Churchill (1983) and begins with communication between the two groups. Churchill emphasized that a good model must provide for continual feedback and

evaluation to aid and improve the linkage. The facilitator utilizes feedback from the education system and industry to adjust the linking activities. This continual feedback allows for adjustment in the program and constant flow of up-to-date information for the improvement of the system.

Any training program that is intended to prepare students for employment immediately upon completing the program should be systematically evaluated to determine if the program is achieving its intended educational objectives. If the program is not meeting these objectives, which include getting placed in employment related to the training obtained, it has to be revised or simply discarded.

The proposed model to link vocational education and the construction industry was built on the concepts derived from the models reviewed above. In particular the Provus's Discrepancy Evaluation model was especially relevant to this study.

Summary

The literature, indicated that the inability of a vocational program leaders to place program graduates in jobs related to their training is not necessarily an indication that the program has been ineffective. However, a low placement rate when demand is high does signal the existence of a problem. For instance, the literature indicated that a low placement rate may reflect the fact that the training program is in an economically depressed

area, that supply far exceeds demand, that the students are not properly trained to meet the needs of the industry, that the institutions that house the training programs lack placement resources, that graduates are choosing an alternative occupation, or that there is a lack of communication between training institutions and the construction industry.

CHAPTER III

METHODS AND PROCEDURES

General Research Design

Given the research questions, it was apparent that some type of survey research was needed. Kerlinger (1973) identified five possible survey research methods: personal interview, mail questionnaires, the panel technique, telephone interview, and controlled observation.

For this study a combination of personal meetings and interviews in addition to the mail questionnaire method was utilized. The personal contact allowed a thorough understanding of the key individuals and organizations involved in the study. It provided background material for the development of the questionnaires and also provided a basis for validating the research model. The mail questionnaire method was chosen primarily because of the large sample (1079) of building contractors being surveyed. This method is the least expensive and time-consuming for such a large sample. Further, the mail questionnaire forces respondents to limit their answers to items included on the questionnaire rather than to submit information which may be extraneous or interpretively subjective. It

should be noted, however, that respondents may omit information by not responding to all questionnaire items.

Kerlinger (1973) stated that the mail questionnaire method has two primary disadvantages: possible lack of response from members of the potential sample and the inability of the researcher to check the accuracy of questionnaire responses. To combat the first condition, a personal visit was conducted to each head office of each of the four construction groups taking part in this survey and to the Division of Vocational, Adult, and Community Education in Tallahassee. A detailed explanation of the study and its benefits was presented. A cover letter was obtained from each organization encouraging their selected sample members to participate in the study (see Appendices D, E, F, G, H). In addition the trade associations mentioned the survey in their respective newsletters in the issue coincident with the mailing of the questionnaire. Further, a follow-up procedure was used to ensure an adequate statistical response rate.

The second condition, accuracy, was enhanced by developing the questionnaire to solicit factual information and opinions which did not pose any professional or personal threat to the respondents.

Instrumentation

Both questionnaires used were developed as a part of a major research project being conducted by the staff of the School of Building Construction at the University of

Florida sponsored by a research grant from the Building Construction Industry Advisory Committee (BCIAC). The purpose of the project, under a sponsored research grant, was to determine whether skilled carpenters are being trained in sufficient numbers to fulfill the construction industry's needs in the State of Florida.

A selected sample of questions which were developed by the researcher to be included in the major project was used to encompass the research objectives of this study.

Questionnaire One was designed to gather information and input from the community colleges and vocational-technical centers that offered carpentry training programs (See Appendix A). Questionnaire One was divided into five sections, totaling 28 questions: General Information, Recruitment, Placement, Training, and Communication. The following selected samples of questions were used.

Section III Placement Q16 was used to answer part of Research Question 1: Is there a significant difference ($p < 0.05$) between coordinators of carpentry programs with a high placement rate and those with a low placement rate in their ranking of factors influencing placement of graduates in jobs related to their training? The development of Q16 was based on a list developed from the review of literature on factors or procedures that have been utilized successfully to place graduates of postsecondary vocational job preparatory programs. The list was condensed by eliminating factors that did not relate to building trades

programs, and any procedures that were closely related were combined into one. This condensed the list to 15 placement factors.

Further, site interviews were conducted with three coordinators, one each from a community college, a vocational school, an apprenticeship training program, and with four contractors each representing one of the four trade associations. They were supplied with the list of placement procedures and were asked to respond to the suggested placement strategies. One procedure which the three community college and vocational centers coordinators suggested eliminating was related to the general economic conditions and construction activity in the area. The contractor representatives suggested the elimination of a question related to resume preparation and writing. This reduced the list to 12 placement procedures.

The respondents were asked to indicate on a scale of 1 through 10, 10 being extremely influential, 1 no influence, the degree to which each factor influenced the placement of their graduates in jobs related to their training. This question was used for training program coordinators only. It was not included in the instrument addressed to the construction industry.

Section IV Training, Q21 was used to answer Research Question 2: Is there a significant difference ($p<0.05$) between practitioners in the construction industry and vocational educators in their perception of skills

necessary for a skilled carpenter? This research question was based on the lack of congruence in perception of importance of skills necessary between educators in training programs and practitioners in the industry. Input from several sources was needed in the development of Q21 because it would be included in the two instruments addressed to program coordinators and to construction contractors (Appendix B, Q7).

Initially a curriculum outline was obtained from the Florida Department of Education related to the course, Residential and Commercial Carpentry CIP No.IN46. 020100. A curriculum outline was also obtained from the Florida Department of Labor, Bureau of Apprenticeship, related to apprenticeship carpentry training of programs registered with the Bureau in the State of Florida.

Based on these two sources and on the findings of the review of literature related to the needs of the industry, a list was developed of the various skills which a skilled carpenter should possess. Again content validity was established with the sample of seven representatives; several items were either combined or deleted. This reduced the list of skills to 20.

The respondents' perceptions were solicited using a forced response, 4-point Likert Scale. The respondents were asked to indicate the degree of each skill which, in their opinion, students of carpentry training programs should possess at the completion of their training.

Question 19 and Q20 were used to answer Research Questions 5 and 6. These two questions were based on Freeman's theory of career choice (1977) that factors influencing choice of an occupation upon completion of a training program can be classified into two groups: those in an individual, such as preferences and abilities, and the wages and job characteristics determined by the market.

With Q19 educators were asked what was the percent of graduates of carpentry training programs who were seeking an alternative occupation. In Q20 the respondents were a asked to indicate on scale of 10 through 1 (10 being very important) the degree to which each factor influenced their graduates to choose an alternative occupation.

Questionnaire Two was designed to gather information and input from contractors who hired carpenters operating in the construction industry (see Appendix B). This questionnaire had a total of 32 questions concerning supply and demand of skilled carpenters. The following selected questions were used.

Question 7 (identical to Q21 on the educators' questionnaire) was used for Research Question 2 regarding rating of skills necessary for a skilled carpenter.

Question 22 was used for Research Question 3: How do construction contractors rate the Florida Department of Education training programs compared to other training sources? The respondents were asked to rate on a 4- point

Likert scale the degree to which each program supplied carpenters who best fulfill their needs.

Question 29 and Q31 was used for Research Question 4: What level of communication is there between carpentry training program personnel supplying carpenters and contractors in the industry that hire carpenters and how could this be improved? The review of literature strongly indicated that lack of communication may be one of the variables involved in students of state-supported training programs failing to find employment despite the large demand by industry. Question 31 was developed to determine the level of communication that construction contractors have with community colleges and voc-tech training program leaders compared to other training programs. The respondents were asked to rate the level of communication they have with those involved in each program supplying skilled carpenters.

With Q29 contractors were asked what is the best method of establishing better communication (education-industry linkage). The contractors were provided with four methods to improve communication and they were asked to rank each method on a 4-point Likert scale.

Question 8 was used to answer Research Question 6: What is the average wage rate for a journeyman carpenter? Is there a difference among contractor groups operating in Florida's five economic regions with respect to the wages they pay skilled carpenters? These questions were based on

the economic theory of supply and demand that indicates that wages affect the supply of manpower to a labor market. The supply/demand concept indicated that if wages are not raised, demand is large but supply is small. Question 8 was used to solicit responses from contractors classified in five groups based on economic activity of their regions. The contractors were asked to indicate in dollars the hourly wage they paid for a skilled carpenter.

Content Validity

The content validity of the instruments was established by a field test using a sample of seven representatives. Three program coordinators were selected representing a vocational-technical center, a community college, and an apprenticeship program. Four contractors were selected, one from each of the construction industry associations.

In interviews, each representative was asked to respond to the instruments, make suggestions for additions or deletions, and comment on the overall clarity of the instrument.

Sample Population

The study sampled two populations: (a) state-supported training program coordinators and (b) practitioners in the construction industry. The state-supported training programs refer to those state institutions where the job preparatory program Residential and Commercial Carpentry, CIP No. IN 46.020100 as outlined in the Vocational Education Programs Course Standards

(Florida Division of Vocational, Adult, and Community Education, 1986) was offered. Preliminary research revealed that a total of 42 institutions offered this program. Of these, 28 were vocational-technical centers, 3 were community colleges, and 11 were high schools. Only the 31 postsecondary institutions were included in this study. A list of program coordinators was obtained from the Department of Education. A 100% response rate was obtained by the researcher. (See Appendix L for list of programs and locations on map.)

The four major construction groups in Florida were included: Associated Builders and Contractors (ABC), Associated General Contractors of America (AGC), Florida Home Builders Association (FHBA), Union Brotherhood of Carpenters and Joiners of America. Discussions were held with representatives of each of the construction associations and they encouraged their members to participate in this study and supplied cover letters from their associations to accompany the questionnaire.

The sampling frame to survey construction contractors in the industry was based on the membership lists of the construction organizations which include members who hired carpenters. A total of 1079 questionnaires were mailed; responses from 281 contractors were obtained which represented 26% of a population of 1079 contractors who were members of the four major construction groups that hire carpenters.

This low response rate from the construction contractor group necessitated an attempt to contact the non-respondents to examine them for possible bias among the group. However the researcher was unsuccessful in reaching a large enough sample of non-respondents to report the results. The unavailability of this data from the non-responding construction contractors may affect generalizations from this study. This limitation was minimized to some degree by obtaining a cross-sectional sample from Florida's five regions and from the four contractor groups; approximately a 26% response rate was obtained from each region and from each group. (See Tables 2 and 3)

Collection of Data

The mailed questionnaire was accompanied by a self-addressed stamped envelope and other material: a cover letter from the Director of the School of Building Construction of the University of Florida (see Appendix C) explaining the purpose of the study and soliciting participation by the various contractors and educators and cover letters from the respective construction associations or Florida's Division of Vocational, Adult, and Community Education. (See Appendices D, E, F, G, H.)

Analysis of Data

Six research questions were postulated for this study. The first analysis pertained to testing if any significant difference existed between responses of two groups of

program coordinators (high placement rate and low placement rate). The analysis was carried out using the Wilcoxon-rank-sum test which is equivalent to the Mann-Whitney U test (Agresti & Agresti, 1981, p. 175). This test was chosen because it could be used with two samples of unequal number and the data were ordinal-scaled ranks (Huck, Cormier, & Bounds 1976, pp. 209-210). An alpha level of 0.05 significance was used.

The second analysis pertained to testing if any significant difference existed between responses by two groups in the ratings of tasks necessary for a skilled carpenter. A multivariate analysis of variance (MANOVA) was used to analyze the responses to the question rating desirability of 20 tasks. This method of analysis was chosen because the researcher wished to compare the responses of vocational educators and contractors on several correlated (non-independent) responses. MANOVA takes these correlations into account in the analysis, preventing inflation of the type I error rate. The overall test statistic for MANOVA was tested using the Wilk's lambda criterion (Morrison, 1976, p. 222-223). Post-hoc univariate comparisons using the Student-Newman-Keuls *t*-test to show where the differences existed. Research Questions 3, 4, and 5 were each analyzed using repeated measures of analyses of variance (ANOVA). This was used because the researcher wished to know in every case if the numerical ratings, generated on the same scale and repeated

for five responses to each question, differed significantly from response to response. This type of analysis is appropriate when the several responses in the analysis are obtained from the same person for each set of observations. The set becomes a repeated measure set, whose elements are correlated responses and requires repeated measures of ANOVA. Follow-up pairwise comparisons using Fisher's LSD test and Duncan's Multiple Range test (Keppel, 1982, p. 15) were made.

A part of Research Question 6 required an analysis to determine if any difference in wage rates existed among the five groups representing Florida's economic regions. A one-way analysis of variance within a general linear model (GLM) was used because the cells (regions) were unbalanced; i.e., the numbers of responses from each region were not equal due to the higher concentration of contractors where more economic activity exists. GLM is necessary for valid analysis of unbalanced data, followed by post-hoc comparisons utilizing the Student-Newman-Keuls procedure.

Model Development

Several statistical procedures were used to answer the six research questions pertaining to the discrepancy between the low placement rate of carpentry training program graduates and the high industry demand for skilled carpenters. The variables that were determined to be most significant ($p<.05$) pertaining to the Florida Department of

Education training programs were incorporated in this model. The model development is detailed in Chapter V.

CHAPTER IV

PRESENTATION OF THE RESULTS

This chapter is a presentation of the findings from the analyses of the data obtained from the two survey instruments described in Chapter III. Six research questions were postulated for this study relating to the discrepancy between the high demand for skilled carpenters in the construction industry and the low placement rate of graduates of the postsecondary job preparatory program in residential and commercial carpentry offered in community colleges and vocational-technical centers in Florida.

This chapter is organized in six sections relating to the six groups of research questions. A total of 1,110 questionnaires were sent. Thirty one (100%) of the questionnaires submitted to carpentry program course instructors (see Table 1) were returned. Data in Tables 2 and 3 indicate that 281 (26%) of the 1079 questionnaires submitted to the four groups of construction contractors (practitioners) representing Florida's five economic regions were returned. This information provided a significant data base to answer the six research questions.

Table 1

Educators' Response to Instruments

Vocational Educators	No.Sent	No. Responded	%
Voc-Centers	28	28	100
Community Colleges	3	3	100
Total	31	31	100

Table 2

Practitioners' Response by Association

Industry Association	No. sent	No. Responded	%
ABC	280	64	23
AGC	267	70	26
FHBA	363	95	26
Union	169	52	31
Total	1079	281	26%

Table 3

Practitioners' Response by Region

Region	No. Sent	No. Responded	%
Central	170	55	32
Northeast	165	41	25
Northwest	85	22	26
Southeast	360	90	25
Southwest	298	73	24
Total	1079	281	26%

Research Question 1

Is there a significant difference ($p<.05$) between coordinators of carpentry programs with a high placement rate and those of carpentry programs with a low placement rate in their ranking of factors influencing placement of graduates in jobs related to their training? Without regard to placement rate, how do the coordinators rank the factors?

Vocational educators were divided into two subgroups based on placement rate: those from the 17 programs with placement rates of 70% or over and those from the 14 programs with placement rates of less than 70%. They were provided with 12 factors that were considered to influence

placement of graduates from the program and were asked to rate each factor on a scale of 1 through 10 (10: very influential, 1: no influence).

Analysis of responses indicated that the low-placement and high-placement groups did not differ in ranking of factors influencing placement of graduates in jobs related to their training at an alpha level of .05 of significance. Analysis was carried out using the Wilcoxon-rank-sum test. Absolute values of the z statistic ranged from 0.0 through 1.83. This procedure converts raw data to ranks; the two mean ranks representing the two groups for each factor were not significantly different because none of the factors had a z value that met the .05 level of significance criterion.

The 12 factors affecting placement were ranked in order according to the p-value (the probability that the z value was due to chance and was not truly representative of difference). The greater the difference between the two groups in the specified placement factors, the smaller the p-value.

As indicated in Table 4, at the .05 alpha level of significance there was no significant difference in ranking of placement factors between the two groups. However there were two factors that approached the .05 level of significance: Responses to the item "the quality and adequacy of training provided to students" indicated that the coordinators in the high-placement rate group ranked this factor higher than the coordinators in the

Table 4

Placement Factors Ranked According to p-Value

Description	Group[a]	z	Rank	p
The quality & adequacy of training provided to students	L H	1.83	12.38 17.88	0.06
Counseling students on job opportunities & requirements	L H	1.69	17.92 12.63	0.09
Help from students' friends and relatives to get job contacts	L H	1.39	18.04 13.56	0.16
Cooperation between instructor and placement officer	L H	1.13	17.13 13.50	0.25
Actively contacting contractors & inviting them to visit the program & interview students	L H	0.95	13.35 16.34	0.34
The central placement center for the voc-tech/ community college	L H	0.87	13.38 16.15	0.38
Individual efforts and personal contacts of the instructor	L H	0.84	17.04 14.32	0.40
Existence of an advisory or craft committee for the program	L H	0.60	16.62 14.65	0.54
Showing up at construction jobs and asking for work	L H	0.38	14.31 15.56	0.70
Providing information on local employment opportunities	L H	0.34	14.85 16.00	0.73
Relationship between program personnel & local contractors	L H	0.22	15.08 15.82	0.82

Table 4- Continued

Description	Group[a]	z	Rank	p
Students had previous on-site experience	L H	0.0	15.46 15.53	1.00

[a] L = Coordinators in the low-placement rate group.
H = Coordinators in the high-placement rate group.

low-placement rate group at an alpha level of .06. Responses to "counseling students on job opportunities and requirements" indicated that coordinators in the low-placement rate group ranked it higher than the coordinators in the high-placement rate group at an alpha level of .09.

The factor over which the two groups disagreed least was "students had previous on-site experience". An alpha level of 1.0 indicated no disagreement whatsoever.

Combining the two groups and obtaining mean ratings (1-10) for each of the 12 factors provided the relative ranks of the responses for the total group.

Information in Table 5 indicates that the vocational educators regarded the quality and adequacy of training as having the greatest influence on placement followed by the individual's effort and personal contacts of the instructor. The third highest item was the relationship between program personnel and local contractors. Based on the three top-ranked responses to this question, the

Table 5

Placement Factors Ranked According to Mean

Description	n	Mean	Min	Max	S.D
The quality and adequacy of training provided to the students	31	8.60	3	10	1.91
Individual efforts and personal contacts of the instructor	31	8.03	4	10	1.92
Relationship between program personnel & local contractors	31	7.90	3	10	2.19
Cooperation between instructor and placement officer	30	7.17	0	10	2.54
Providing information on local employment opportunities	31	7.13	2	10	2.20
Help from students' friends and relatives to get job contacts	31	7.10	1	10	2.52
Students had previous on - 2.78 site experience.	31	6.87	1	10	
Counseling students on job opportunities & requirements	30	6.63	2	10	2.25
Showing up at construction jobs and asking for work	29	6.48	0	10	1.08
Actively contacting contractors & inviting them to visit the program & interview students	30	6.43	2	10	2.44
Existence of an advisory or craft committee for the program	31	6.32	1	10	2.48
The central placement center for voc-tec/community college	30	5.9	0	10	2.92

carpentry educators felt that they were personally responsible to a large degree for the successful placement of their students. The central placement office ranked last in terms of placement factors indicating that the vocational educators had little confidence in the central placement office. Next to last was the "existence of an advisory or craft committee for the program" indicating that the advisory committee was not utilized to help place students.

Respondents were asked to follow up their rankings of placement factors with their opinion of what one factor had the most effect on the placement of their graduates. The vast majority listed instructor contacts in the industry as being most influential. Several comments were also made referring to student contact as well as personal attitude and ability.

Research Question 2

Is there a significant difference ($p<.05$) between practitioners in the construction industry and vocational educators in their perception of skills necessary for a skilled carpenter?

The two groups rated 20 tasks necessary for a skilled carpenter on a scale of 1 through 4. Multivariate analysis of variance (MANOVA) was used to test this research question. The overall test statistic for the MANOVA was found to be significant ($p<.05$) by the Wilks's lambda criterion, indicating that the two groups differed

on at least one pair of mean responses ($F = 3.01$; $df = 20,259$; $p<0.0001$).

The researcher concluded that at the 95% level of confidence there was a significant difference between vocational educators and practitioners in the construction industry in their perception of skills necessary for a skilled carpenter.

The calculated F-ratio was used to identify the greatest differences occurring between the two groups on each skill. The 20 skills were ranked (see Table 6) in order according to the calculated F-ratio; the greater the F-ratio the greater the difference between the two groups in regard to the specified skill. The p-value from the analysis for each item provided an indication of the difference.

Further post-hoc comparisons were evaluated using the Student-Newman-Keuls *t*-test (SNK) at an alpha level of 0.05. The results of the SNK test are included in Table 6 as well.

Analysis of responses as shown in Table 6 indicated that the two groups differed significantly in the rating of necessary skills on five items: install insulation and sound control material, frame partitions, frame roofs, conduct site preparation and layouts, and install decking and, sheathing. Vocational educators rated all of the five skills higher than did construction contractors. A look at the rest of the skills indicated that vocational educators

Table 6

GLM MANOVA and SNK Test for Each Skill Ranked According to F-Ratio

Skill	Group/n[a]	Mean	F	p	Grouping[b]
Install insulation and sound control material	E=30 I=253	2.97 2.34	10.92	0.0011	A B
Frame partitions	E=30 I=253	3.87 3.24	10.62	0.0013	A B
Frame roofs	E=30 I=253	3.70 3.15	7.50	0.0066	A B
Conduct site preparation and layouts	E=30 I=253	3.0 2.61	4.92	0.0274	A B
Install decking and sheathing	E=30 I=253	3.60 3.22	4.05	0.0451	A B
Install exterior wall covering and trim	E=30 I=253	3.43 3.06	3.82	0.0517	A A
Read blueprints	E=30 I=253	3.43 3.06	3.74	0.0543	A A
Frame floor and sills	E=30 I=253	3.57 3.22	3.28	0.0711	A A
Install paneling, furring,soffit, ceiling	E=30 I=253	3.30 2.97	2.88	0.0908	A A
Install door,window frame and units	E=30 I=253	3.37 3.13	1.50	0.2211	A A
Install drywall material	E=30 I=253	2.74 2.39	1.42	0.2341	A A
Apply weather stripping and caulking	E=30 I=253	3.06 2.84	1.41	0.2368	A A
Build trusses	E=30 I=253	2.77 2.43	1.31	0.2539	A A

Table 6- Continued

Skill	Group/n[a]	Mean	F	p	Grouping[b]
Construction forms (piers, columns, beams, slabs, stairs, bridge, deck)	E=30 I=253	3.15 2.93	1.25	0.2646	A A
Install cabinets, fixtures and shelving	E=30 I=253	2.97 2.79	0.87	0.3512	A A
Install structural timber	E=30 I=253	3.03 2.90	0.47	0.4937	A A
Construction forms (footing, walls, edge, curb)	E=30 I=253	3.19 3.06	0.41	0.5213	A A
Pre-plan forthcoming activities	E=30 I=253	2.67 2.58	0.23	0.6299	A A
Issue instructions to crew members	E=30 I=253	2.74 2.66	0.15	0.6942	A A
Construct interior stairs	E=30 I=253	2.98 2.93	0.06	0.8106	A A

[a] E= Coordinators group (educators).
I= Construction contractors group (industry).

[b] A skill is indicated with the same letter if a significant difference between groups was not found.

rated all 20 skills higher than did construction contractors. The contractors' lower rating of every skill supported the findings of the related literature that the carpentry trade has become increasingly specialized. However, the vocational educators' higher ratings indicated that the training programs were still stressing competence

in a broad area of training, despite the industry's need for specialization.

Construction contractors in Florida indicated that framing and formwork of all types were deemed as an absolutely necessary skill that a carpenter should be able to perform. Installing insulation and installing drywall material were ranked as the least necessary tasks that a skilled carpenter should be able to perform proficiently. More significant is that 10 out of the 20 tasks were not considered as absolutely necessary or necessary (means of less than 3.0) for a skilled carpenter by the contractors, but only as desirable.

According to vocational educators at voc-tech centers and community colleges (Table 6), the greatest emphasis is placed on the three traditional framing skills. Based on the means, "frame partitions," "frame roofs," and "frame floor and sills" were rated by the educators first, second, and fourth respectively. Form work construction skills were ranked particularly low with "construct forms (footing, walls, edge, curb)" and "construct forms (piers, columns, beam, slab, bridge, deck)" finishing ninth and twelfth respectively. This could suggest a bias toward residential construction carpentry skills. Somewhat significant was the fact that the vocational educators felt that the least necessary skills of a carpenter were those that could be categorized as managerial or supervisory. "Pre-plan future activities" and "issue instructions to crew members" were

rated the two least important skills of a skilled carpenter despite the fact that a large percentage of construction superintendents worked through the carpentry trade before reaching the level of superintendent.

What is more significant is that 12 of the 20 tasks listed received a ranking by educators between 3.0 and 3.87, or between "necessary" and "absolutely necessary." The remaining 8 items were ranked between 2.67 and 3.0, which again is considered "necessary." These high ratings further indicate that vocational educators are stressing a broad area of competency despite the constructionindustry's need for specialization.

Research Question 3

How do construction contractors rate the Florida Department of Education training programs compared to other training sources?

Contractors were asked to rate on a 4-point Likert scale (4 being the best, 1 being the worst) the degree to which each program supplied carpenters who best fulfill their needs.

Analysis of data for rating sources of skilled carpenters was carried out by repeated measures one-way analysis of variance (ANOVA). A significant test statistic indicated that at least two sources were rated differently ($F=71.45$; $df=4,237$; $P<0.0001$).

The follow-up comparisons utilizing Fisher's LSD procedure demonstrated that the responses were all rated

significantly different from each other. The mean ratings given by construction contractors to the five training programs are shown in Table 7.

The researcher concluded that, at 95% level of confidence, there were significant differences in the quality of carpenters produced by the five main sources supplying these tradesmen, as perceived by construction contractors who hire carpenters. Contractors rated "on-the-job training" as the best source of carpenters, followed by "open shop apprenticeship programs," "vocational training centers" and "union apprenticeship programs", and last, "community college training."

Table 7

Rating of Training Programs by Construction Contractors

Training program[a]	n	Mean	Grouping[b]
On-the-job training	219	3.25	A
Open shop apprenticeship programs	204	2.46	B
Vocational training centers	198	2.29	C
Union apprenticeship program	208	2.26	C
Community college training	192	1.98	D

[a] Vocational training centers and community college training are the two Florida Department of Education training programs.

[b] Programs with the same letter were not significantly different.

The high ranking of "on-the-job training" shows a definite need for extended training outside the classroom and in the field. "Open-shop apprenticeship programs" were carpenters. Not surprisingly, due to the small number of union contractors compared to non-union contractors being surveyed (52 out of 281), "union apprenticeship programs" were rated low (2.26). However, the response that signaled the existence of a problem was that community college training and vocational training centers were rated as the least effective source supplying skilled carpenters to Florida's construction industry with 1.98 and 2.29 ratings, respectively, on a 4.0 scale.

Research Question 4

What level of communication is there between carpentry training program personnel supplying carpenters and contractors in the industry that hire carpenters and how could this be improved?

Contractors were asked to rate on a 4-point Likert scale the level of communication they had with personnel in each training program (4 being very close, 1 being very remote). A significant test statistic ($p<.05$) using repeated measures ANOVA indicated that at least two sources were rated differently ($F = 5.37$; $df = 4,253$; $p < 0.0003$). Follow-up comparisons utilizing Fisher's LSD procedure demonstrated that only one source was rated significantly different from the other four sources. The five training programs ranked according to the means are

listed in Table 8. Programs grouped together indicate no significant difference as analyzed by the LSD procedure.

Table 8

Construction Contractors Ratings of the Level of Communication With Training Program Personnel.

Program	n	Mean	Grouping[a]
On-the-job training	244	3.25	A
Open shop apprenticeship program	241	1.91	B
Community college training	239	1.66	B
Vocational training centers	242	1.55	B
Union apprenticeship programs	250	1.47	B

[a] Programs with the same letter were not significantly different.

The researcher concluded that, at 95% level of confidence, there was significant difference in the level of communication among the personnel from individual training programs supplying carpenters and construction contractors.

Contractors rated "on-the-job training" as having the closest level of communication with them, and this was the only program rated significantly different. The other four sources were all rated equal, ranking from very remote to remote level of communication.

The second part of Research Question 4 was to determine the best method for improving the level of communication between personnel from the training programs supplying carpenters and construction contractors.

Contractors were asked to rank on a 1-4 scale (4 being the most important) four methods of establishing an industry/training program linkage. A significant test statistic ($p<.05$) using repeated measures ANOVA indicated that at least two methods were ranked significantly different ($F=2.58$; $df=3,189$; $p<0.0001$). Follow-up comparisons utilizing Fisher's (LSD) procedure indicated that the four methods were ranked into three groups as indicated in Table 9.

Analysis of responses using an alpha level = 0.05 as shown in Table 9, indicates that "formal meeting of the two groups" was rated significantly higher than "attending educational functions" and "sitting on an advisory committee." However, "written contact" was rated not significantly different from either "formal meeting of the two groups" or "attending educational functions" and "sitting on an advisory committee." A Duncan Multiple Range test was utilized to double check the significance of the follow-up comparisons and it demonstrated the same difference in significance and grouping as indicated using Fisher's LSD.

Table 9

Linkage Methods Ranked According to Means Utilizing LSD and Duncan's Multiple Test

Method	n	Mean	Grouping[a]
Formal meeting of the two groups	180	3.17	A
Written contact	169	2.82	A B
Attending educational functions	172	2.55	B
Sitting on a advisory committee	174	2.51	B

[a] Programs with the same letters were not significantly different.

Research Question 5

What is the percent of graduates who are reported as seeking an alternative occupation upon completion of a training program? What are the reported reasons for the graduates choosing not to enter the carpentry trade?

Vocational educators were first asked to estimate the percentage of program graduates seeking an alternate occupation after completion of the training program.

Table 10

Graduates Seeking an Alternative Occupation

n	Mean	Median	Low	High
31	23.1%	15.0%	1.0%	85.0%

As can be seen in Table 10, 23% of the carpentry program graduates were reported to be choosing not to enter the carpentry trade. In order to determine the reasons why this was occurring, vocational educators were asked to rank several potential reasons using a scale of 1 through 10 (10 being a very important reason, 1 being no reason at all). Educators' ratings of reasons for graduates seeking alternate occupations were analyzed by repeated measures one-way ANOVA, with follow-up pairwise comparisons using Fisher's LSD test. The ANOVA results indicated that responses were rated significantly different ($F = 15.54$; $df = 4,27$; $p < 0.0001$).

Table 11

Educators' Ratings of Reasons for Graduates Seeking Alternate Occupations, Ranked According to Mean

Factor	n	Mean	Grouping[a]
Low wage rates	28	6.68	A
Students' preference	28	5.32	B
Characteristics and conditions of the job	28	4.71	B
Students feel they have not acquired the training necessary to perform the job	28	2.25	C
No jobs available for carpenters in the area	28	2.18	C

[a] Reasons with the same letters were not significantly different.

The results as shown in Table 11 indicate that the "low wage rates" response was rated more important than all other responses. "Job characteristics and conditions" and "students' preference" responses were rated higher than "not acquired necessary training" and "no jobs available" responses.

Research Question 6

What is the average wage rate for a journeyman carpenter? Is there a difference among contractors operating in Florida's five economic regions with respect to the wages they pay skilled carpenters?

Construction contractors were asked to indicate the average hourly wage paid to a journeyman carpenter. As shown in Table 12, journeyman carpenters in the construction industry in Florida were paid an average hourly wage of $10.98, the minimum being $6.50 and the maximum being $18.00.

Table 12

Average Hourly Wage Paid to a Journeyman Carpenter by Contractors

n	Avg. wage	Low	High	S.D.
239	$10.98	$6.50	$18.00	2.114

The responses were grouped into five subgroups corresponding to Florida's five economic regions to

determine if any significant difference in wage rates existed among the regions. A one-way analysis of variance within a general linear model (GLM) analysis was carried out, and this indicated that there were significant differences among the five groups ($F= 31.38$; $df= 4,234$; $p<0.0001$).

A post-hoc comparison using the Student-Newman-Keuls test at alpha level = 0.05 was done to determine where the difference existed.

From Table 13 it can be seen that the central, northeast, and southwest regions did not differ significantly on mean wage, but that the northwest and

Table 13

Wage Rates by Region Ranked According to Mean

Region	n	Mean	Grouping[a]
Southeast	81	$12.58	A
Central	42	$10.70	B
Northeast	35	$10.65	B
Southwest	61	$ 9.92	B
Northwest	20	$ 8.87	C

[a] Regions with the same letter were not significantly different.

southeast regions differed significantly from each other and from the remaining three regions. The southeast region

reported highest mean wage and the northwest region reported lowest mean wage; the remaining regions reported mean wages in the mid-range.

CHAPTER V

A RESEARCH MODEL FOR THE CONSTRUCTION CRAFTS

The primary objective of this investigation was to develop a research methodology leading to a model that could be utilized by future researchers to determine the variables influencing the discrepancy between the high demand for skilled craftsmen in the construction industry and the low placement rate of completers of postsecondary vocational programs in the construction trades.

In the process of designing this model, several models that related to evaluation of a program were studied and analyzed to determine which could be adopted to form a basis for designing the model for this study.

Presented in this chapter is a summary of Provus's Discrepancy Evaluation model and how the model was incorporated in a research model to evaluate discrepancies between educational programs supplying skilled craftsmen and contractors in the construction industry hiring skilled craftsmen.

Several variables were investigated in this study and those determined to be most significant in relation to this

discrepancy were incorporated in a suggested model. A figure to summarize the model was developed. The model was divided into five stages and each stage was presented and detailed in a flow chart.

Provus's Discrepancy Evaluation Model

Malcolm Provus (1971) stated

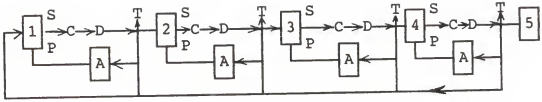
> program evaluation is the process of (1) defining program standards, (2) determining whether a discrepancy exists between some aspect of program performance and the standards governing that aspect of the program, and 3) using discrepancy information either to change performance or to change program standards. (p. 183)

Under the Discrepancy Evaluation model, the evaluation of a program contains four major developmental stages and three major content categories essential for evaluation of an ongoing program (see Figure 5-1).

Stages 1 through 4 evaluate single programs. The fifth stage is an optional stage to facilitate the comparison of two or more programs

Stages	Content		
	Input	Process	Output
1. Design	Design Adequacy		
2. Installation	Installation Fidelity		
3. Process	Process Adjustment		
4. Product	Product Assessment		
5. Program Comparison	Cost-Benefit Analysis		

Figure 5-1 Stages and content categories
Source: Discrepancy Evaluation for Educational Program Improvement and Assessment (p. 184) by Provus, 1971, Berkeley, Ca: McCutchan Publishing Corporation. Copyright 1971 by publisher. Permission granted by the Publisher.



S- Standard

P- Program performance

C- Comparison

D- Discrepancy information

A- To change program performance or standards

T- To terminate program

Figure 5-2 Discrepancy evaluation model

Source : Discrepancy Evaluation for Educational Program Improvement and Assessment (p. 184) by Provus,1971, Berkeley, Ca: McCutchan Publishing Corporation. Copyright 1971 by publisher. Permission granted by the Publisher.

The flow chart in Figure 5-2 illustrates Provus' process of evaluating an ongoing program starts at every stage with a step in which standards (S) have been established as a part of evaluating the program. Appropriate evidence is obtained on performance (P), and this is compared (C) with the standard. Any discrepancy (D) is then evident. Discrepancy information always leads to a decision to either go on to the next stage, recycle the stage after there has been a change in the program's standards or operations, recycle to the first stage (A), or terminate the project (T).

It should be noted that Provus's model necessitates an evaluation of the goals and objectives themselves. This occurs when program performance data do not match standards. Provus pointed out that such a discrepancy requires the program planner either to revise the program's

standards, modify the program, or discard the whole thing. If no significant discrepancy is found, the staff moves on to the next stage in the cycle until the whole program is acceptable and valid or has been discarded as undesirable.

In the construction crafts model, the concept of setting a standard, making a comparison at each stage between standard and reality, and then determining what difference (discrepancy) exists in that aspect of the program which was adopted from Provus's model.

The standard (S) was incorporated to represent the construction industry's needs and standards; program performance (P) was incorporated to represent the product supplied by the vocational training programs; comparison (C) was included to represent a discrepancy in what is needed by industry and what is supplied by the training programs; discrepancy information (D) was incorporated to determine the degree of discrepancy; change program performance standards (A) was incorporated to determine whether the discrepancy will lead to a change in the program standards and training and modification of the curriculum based on the construction industry's need. Terminate the program (T) option was not be incorporated because one of the objectives of this study was to avoid the elimination of state-supported training programs.

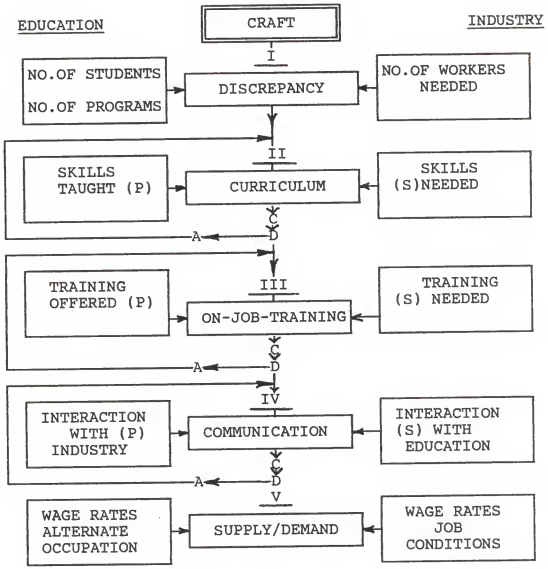


Figure 5-3 Research discrepancy model

Stage I: Discrepancy

The first stage of the model is to determine the manpower needs for the craft to be investigated. The researcher suggests not to assume that there is a shortage or a discrepancy, but to determine accurately the demand.

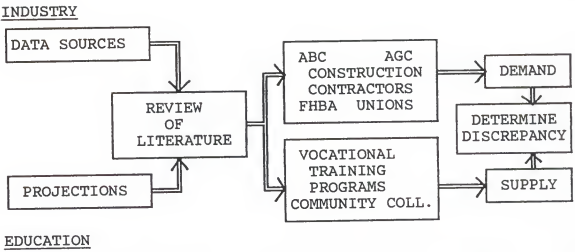


Figure 5-4 Stage I discrepancy flow chart

In regard to the review of literature, the U.S Department of Labor's Bureau of Labor Statistics and Employment and Training Administration and the Florida Department of Labor and Employment Security's Bureau of Research and Analysis have a joint federal-state program to "track" the supply of trained workers. The Bureau of Labor Statistics releases the projections of required manpower every 2 years in the Occupational Outlook Handbook. The 1986 issue covers the period 1982-1995. In addition, the Business Round Table publishes studies showing the demand for construction workers in different crafts.

The review of related literature will indicate if the research needs to progress to the next step. A preliminary investigation should determine if, indeed, a shortage in these craft exists and to what degree. Personal interviews should be conducted with representatives of the four major trade associations: the Associated Builders & Contractors, the Associated General Contractors, the Florida Home

Builders Association, and the union pertaining to that craft. Data regarding supply of craftsmen available, additional supply needed and in what regional location will be obtained.

Personal interviews need to be conducted with the Florida Division of Vocational, Adult, and Community Education and with the Florida Bureau of Apprenticeship to determine the number of training programs available in that craft, the number of students enrolled, and number of completers being placed.

This preliminary analysis will determine if a discrepancy exists, to what extent, and in what locations.

Stage II: Curriculum Modification

If a supply/demand disequilibrium exists, the curriculum is the first part to be investigated (see Figure 5-5). The research question pertaining to the skills needed by construction contractors in the industry and the skills taught in vocational training programs indicated that there is a significant difference between vocational educators' and constructor practitioners' perceptions of the skills needed.

The investigation indicated that the building trades have become increasingly specialized, yet vocational educators' responses indicated that the staff of vocational training programs have been stressing a broad area of training in their curricula.

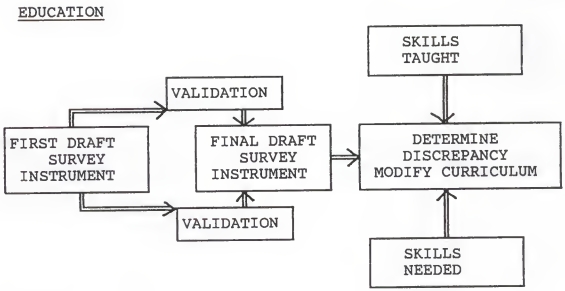


Figure 5-5 Stage II curriculum flow chart

Vocational education system personnel have every opportunity to design and implement curricula and training to benefit the current requirements of the construction industry. This stage of the model provides direction for curriculum modification based on input from a survey of construction contractors who hire skilled personnel in a particular craft and of vocational educators who train students in that craft in order to determine what skills are needed by industry (S) and what are the skills taught in training programs (P). These two factors are compared (C), and the degree of discrepancy (D) is established. Discrepancy information will always lead to a decision to either go to the next stage if no discrepancy exists, or to modify the curriculum (A) if a discrepancy does exist. Then recycle through the stage after there has been a

change in the program and determine if a discrepancy still exists,if no discrepancy go on to Stage III.

Stage III: On-the-job Training

Just developing a survey instrument and modifying the in-class curriculum is not sufficient for the training programs to produce quality craftsmen as needed by the construction industry. This investigation indicated that lack of on-the-job training is one of the significant variables causing the discrepancy between the high demand for skilled carpenters and low placement rate from training programs. In order for the staffs of the training programs to produce craftsmen with skills and training consistent with the needs of the employer, on-the-job training has to be studied and incorporated into the training programs.

The first step in Stage III is to determine from construction contractors and vocational educators the training provided and needed (see Figure 5-6). This could be accomplished through a process of personal interviews and survey questionnaires. In 1988 none of the vocational construction trades training programs located in Florida had any form of structured supervised training, and it was not required as a condition for graduating from the program. Once the discrepancy is determined, modify the program to incorporate on the-job-training and then go through the same cycle explained in Stage II.

By getting input from industry and from the training program personnel the vocational educator can determine the

type of training needed, the tasks the students have to perform, and for how long; the curriculum can then be

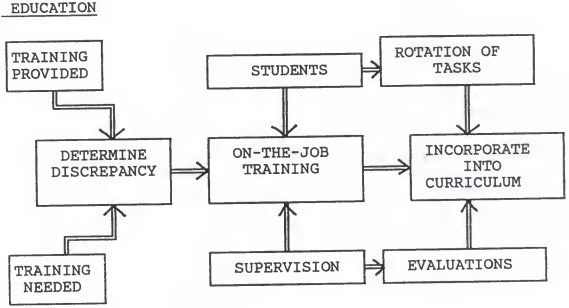


Figure 5-6 Stage III training flow chart

appropriately modified. Further, industry personnel will ensure quality craftsmen by supervision and by providing periodic evaluations of the tasks performed by the student.

Stage IV: Communication

Stages II and III should be supported by close interaction between the personnel from training programs and the construction industry. The research question pertaining to the level of communication that contractors have with personnel associated with vocational programs and community college training was rated by construction contractors as remote to very remote, indicating that the

low level of communication was a significant variable in the discrepancy.

Stage IV of the model (see Figure 5-7) follows the same cycle explained in Stage II and is used to determine the level of communication and identify methods to improve the level of communication and provide better interaction between the personnel from the training programs and the construction industry.

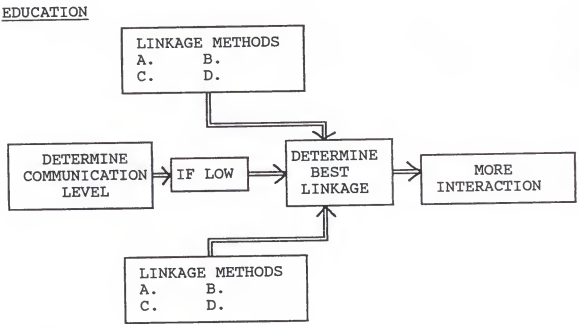


Figure 5-7 Stage IV communication flow chart

As a first step the user will determine from both sides the level of communication pertaining to a particular craft. If low, the next step is to investigate alternative methods to improve communication and increase interaction. In this study, the contractors indicated a low level of

communication with training program personnel and rated formal meetings of the two groups as the best method to improve communication and establish an education-industry linkage.

Stage V: Supply/Demand

Stage V (see Figure 5-8) is optional and used only if a discrepancy in wages exists. Vocational educators in this study indicated that although carpentry jobs were available in the area, 23% of the carpentry program graduates were choosing an alternative field of employment. This they attributed mainly to the low wages paid by the industry.

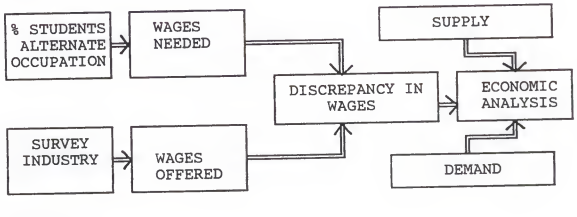


Figure 5-8 Stage V wages flow chart

The basic focus of this part of the model is the wage disparity among the various construction crafts and the effect it has on the supply of craftsmen from training programs. An economic supply/demand investigation, that includes input from contractors, needs to be conducted to

determine the wages paid, what the wages should be, and if contractors would pay higher wages in order to have an adequate supply of skilled construction craftsmen.

Summary

The main objective of this research model is to obtain maximum input from the construction industry personnel which will lead to more interaction with vocational educators and results in quality construction craftsmen with the skills and training required by the contractors who hire skilled labor. By researching every construction craft, vocational educators can structure their curriculum and training to utilize fully the vocational education system so that it becomes the main source producing skilled manpower rather than being rated the "worst" source supplying skilled craftsmen as this investigation has indicated.

This 5-stage research model can be used to investigate and evaluate any construction craft. With slight modifications, it can be utilized to investigate any vocational job preparatory program offered in community colleges and vocational training centers in Florida.

CHAPTER VI

SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Summary

The primary focus of this study was the development of a research model that could be utilized to determine the variables influencing the discrepancy between the low placement rate of graduates of state-supported building trades training programs and the high demand for skilled craftsmen in the Florida construction industry. This was accomplished by investigating the carpentry craft and using it as a study vehicle leading to this model. Two instruments were developed through a series of meetings and personal interviews. One instrument was mailed to 1079 contractors representing the four major construction groups: Associated Builders and Contractors (ABC) Associated General Contractors (AGC), Florida Home Builders Association (FHBA), and the United Brotherhood of carpenters; a second instrument was sent to all 31 postsecondary carpentry training program coordinators in Florida. A total of 1110 questionnaires were sent.

Thirty-one (100%) of the questionnaires submitted to carpentry program coordinators were returned and 281 (26%) submitted to construction contractors who hire carpenters were returned. This low response rate from construction contractors may effect generalizations concluded from this study.

The analyses of data obtained from the two survey instruments were designed to test six groups of research questions to determine the degree and significance each variable influenced the discrepancy. The questions and summary of the findings in regard to each are as follows.

1. Is there a significant difference ($p<.05$) between coordinators of carpentry programs with a high placement rate and those of carpentry programs with a low placement rate in their ranking of factors influencing placement of graduates in jobs related to their training? Without regard to placement rate, how do the coordinators rank the factors?

Two groups of carpentry training program coordinators were provided with 12 factors that were considered to influence placement. The Wilcoxon-rank-sum test indicated that low-placement and high-placement groups did not differ in ranking of factors influencing placement of graduates in jobs related to their training at an alpha level of .05 of significance.

The respondents rated the quality and adequacy of training provided as the most influential element in

placement; the individual efforts and personal contacts of the instructor was the second most influential.

The central placement office was rated as the least influential agent in student placement. Existence of an advisory or craft committee was rated as next to least influential factor in student placement.

2. Is there a significant difference ($p<.05$) between practitioners in the construction industry and vocational educators in their perception of skills necessary for a skilled carpenter?

The carpentry program coordinators group and construction contractors group rated 20 tasks necessary for a skilled carpenter on a 1-4 scale. Multivariate analysis of variance (MANOVA) was used to test this research question. The overall test statistic for the MANOVA was found to be significant by the Wilks' lambda criterion.

The researcher concluded that at a 95% level of confidence there was significant difference between vocational educators and practitioners in the construction industry in their perception of skills necessary for a skilled carpenter.

3. How do construction contractors rate the Florida Department of Education training programs compared to other training sources?

Contractors were asked to rate on a 4-point Likert scale the degree to which five training programs supplied carpenters who best fulfilled their needs; repeated

measures one-way analysis of variance indicated that the programs were rated differently. Follow-up comparisons utilizing Fisher's LSD procedure indicated that community college training and vocational training centers (Florida Department of Education programs) were rated as the worst source supplying carpenters. On-the-job training was rated as the best source.

4. What level of communication is there between carpentry training program personnel supplying carpenters and contractors in the industry that hire carpenters and how could this be improved?

Contractors were asked to rate on a 4-point Likert scale the level of communication they had with personnel in each training program. Repeated measures ANOVA with follow-up comparisons utilizing Fisher's LSD procedure indicated that personnel from community college training and vocational training centers had a very low level of communication with the industry. On-the-job training personnel were rated as having the highest level of communication with industry.

Contractors further indicated that "formal meeting of the two groups" is the best method to improve communications, from a choice of four methods.

5. What is the percent of graduates who are reported as seeking an alternative occupation upon completion of a training program. What are the reported reasons for the graduates choosing not to enter the carpentry trade?

Carpentry program coordinators indicated that 23% of graduates are choosing not to enter the carpentry trade. Coordinators' ratings of the reasons for such choices were analyzed by repeated measures ANOVA with follow-up pairwise comparisons using Fisher's LSD. The "low wage rates" was ranked highest and "no jobs available for carpenters in the area" was ranked as the lowest reason.

6. What is the average wage rate for a journeymen carpenter? Is there a difference among contractors operating in Florida's five economic regions with respect to the wages they pay skilled carpenters?

Construction contractors indicated that the average hourly wage paid to a skilled carpenter in Florida was $10.98. Wage rates paid for skilled carpenters in Florida were analyzed by region using one-way analysis of variance within a general line model (GLM) with post-hoc comparisons utilizing the Student-Newman-Keuls test. This analysis indicated that the southeast paid the highest wages with an average rate of $12.58 which was significantly higher than any other region. The northwest region paid the lowest rates with an average of $8.87 and was significantly lower than all other regions. The central, northeast, and southwest were grouped together with average rates of $10.70, $10.65 and $9.92 respectively.

Based on the concept of Malcolm Provus's Discrepancy Evaluation model, the variables determined most significant in relation to the supply and demand discrepancy were

incorporated into a research model (see Figure 5-2) consisting of five stages:

I. Determine discrepancy.

II. Modify curriculum.

III. Incorporate on-the-job training.

IV. Increase interaction and communication.

V. Examine wage disparity.

This model is intended to combine the resources of the vocational education system with the needs of the construction industry and coordinate these in order to determine the discrepancy in any construction craft. Further, it was recommended as the base for future studies of related building trades training programs.

Conclusions

The investigation revealed several factors that contribute to the discrepancy between the low placement rate of building trades training program graduates and the high industry demand for skilled craftsmen. The most significant factors include a lack of articulation between what is taught in the curriculum and the requirements of the industry, lack of on-the-job training as part of the curricula, a low level of communication between personnel from the training programs and construction contractors, and the tendency of graduates to choose an alternative occupation to carpentry upon graduation. A factor of

little significance was placement procedures utilized by the training programs.

Based on the significant factors determined in this study, a research discrepancy model for building crafts was developed. This model is supposed to act only as a "bench mark" to be utilized by researchers as a proto type model to research other Florida building trades training programs. Results obtained through this model would allow vocational education personnel to design, modify, and implement curricula and training to benefit the requirements of the construction industry.

Discussion

Curriculum

Vocational educators and construction contractors differed significantly on several tasks that a skilled carpenter should perform proficiently. Further, when contractors were asked to rate several training sources that best supply skilled carpenters to suit their needs, contractors rated community college and vocational training centers as being the least satisfactory. A major reason for this discrepancy and the lack of confidence of industry personnel in the abilities of graduates of community colleges and vocational programs appeared to be that the future carpenter has become more specialized and will perform a narrower range of tasks, yet the residential and commercial carpentry curriculum did not reflect this trend.

On-the-job Training

Two hundred and nineteen of the contractors ranked "on-the-job" training as the most significant and utilized source of skilled carpenters. Yet, carpentry training programs offered in community colleges and vocational-technical centers did not require or incorporate any form of on-the-job training as part of their carpentry training or as a condition of graduation.

The inability of the staffs of community colleges and vocational technical programs in Florida to place graduates in construction industry jobs may be due in part to the construction personnel's perception of vocational training as being inferior to the training offered by apprenticeship programs that incorporate on-the-job training and inferior to employing and then training carpenters on the job.

Communication

The analysis indicated the only adequate communication was between the responding contractors and the on-the-job training personnel. The communication between the staffs of community college training or vocational training centers and contractors was rated between "remote to fairly remote."

In order for the staffs of carpentry programs to produce a carpenter with skills consistent with the needs of the employer, interaction between the staffs and the contractors is essential. A lack of communication appeared to contribute significantly to the low level of

confidence of industry personnel had in the type of carpenter that staff of community colleges and vocational technical centers produced. A lack of communication resulted in the low placement rates of their graduates despite the high industry demand for skilled carpenters.

Alternative Choice of Occupation

This investigation examined the issue of low placement from two perspectives: graduates unable to get jobs related to their field of training in carpentry and graduates choosing an alternative occupation upon graduation. This was attributed mainly to low wage rates. The nature of the construction industry is such that contractors generally employ carpenters for the duration of a job, then terminate their employment and rehire carpenters when they get another job. Thus, carpenters do not work as many hours per year (on average) as other jobs, resulting in a net annual income even lower than the hourly figures indicated in this study.

It is evident from this analysis that the depressed wages paid to carpenters in the industry was contributing significantly to the low placement rate of graduates despite the shortage of skilled carpenters in Florida.

Placement

The data indicated that vocational educators from programs with differing placement rates did not differ in ratings of factors influencing placement. Further, as a total group they did not take full advantage of available

resources to place their graduates. The central placement office was rated as the least influential factor, even though the majority of the vocational centers and all community colleges had such centers. This would indicate that the vocational educators had little confidence in the ability of the central placement office. Existence of an advisory or craft committee was rated as the next to least influential factor in student placement, further contributing to lack of communication between personnel from the training programs and the construction industry through what is considered by many as the main communication link between education and industry.

The respondents rated the individual efforts and personal contacts of the instructor being the second most influential. Program administrators left it up to the individual instructors to find jobs for their graduates.

Model

The main purpose of this study was to develop a research discrepancy model for all construction crafts. It should be noted that construction crafts do differ from one craft to another. Requirements of the type and length of training vary and in some crafts a license is required while in others it is not. However, many similarities and conditions do exist in that the demand for skilled labor is required for all construction crafts by the same employer, employees will be working under the same conditions, and they will be supervised by the same personnel in the

construction industry. Further the training of craftsmen by the Florida Department of Education is administered, planned, and supervised by the same department (Industrial Education within the Division of Vocational, Adult, and Community Education) and several crafts are usually taught by the same instructor.

This model should be regarded by researchers as a "bench mark" and a basis to investigate other building trades training programs.

Recommendations

This researcher has analyzed and determined the factors contributing to the low placement of carpentry graduates from vocational technical centers and community college training programs despite the high industry demand for skilled carpenters. Based on the results of this study, certain steps should be taken to overcome this discrepancy and establish the vocational education system as the main source for supplying skilled craftsmen to the Florida construction industry.

The following recommendations are offered by the researcher to remedy this supply/demand disequilibrium:

1. A joint council should be formed (see Figure 6-1) consisting of representatives of the four major construction groups; representatives from the Division of Vocational, Adult, and Community Education; and administrators of the various building trades training programs. Formal meetings should be scheduled for the

purpose of implementing the model developed in this study to modify the curriculum, incorporate on-the-job training, and improve communication and interaction between the groups. The development of effective building trades vocational training programs will only succeed as a result of a joint effort between vocational educators and representatives of the construction industry. Cooperation and interaction between these two parties will result in producing quality craftsmen oriented to the future needs and requirements of the construction industry. It was found that communication levels between contractors and personnel from training programs were low, at best, and it was determined that formal meetings between the two groups was the best method for establishing an industry/training program linkage.

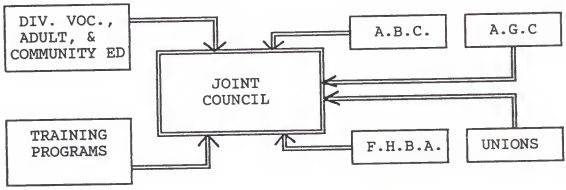


Figure 6-1 Formation of joint council

2. In addition to the efforts of the joint council, the four construction groups (ABC, AGC, FHBA, the unions) should, through their regional chapters, establish or improve communications with the training program personnel

in their regions. The chapter associations must be the communication channel for the contractors because they have the knowledge and resources to see that contractors' needs are being met. This could be achieved by contractors' getting actively involved on advisory committees of these training programs and attending social functions and graduation ceremonies of their respective institutions.

3. Vocational educators should ensure that the advisory committees are active and that they continuously support interaction between personnel from the training programs and the industry. Local contractors should be encouraged to become active in training programs; they should be invited to visit the facilities, to provide input and, if appropriate, to be guest lecturers. Furthermore, educators should attend industry functions to promote their programs and schedule field trips for their students to local job sites. If contractors are made aware of the progress of the training programs or, better yet, take active roles in the programs, they will then be more likely to hire the graduates and promote the training programs to other interested individuals.

4. It is imperative that vocational educators develop and incorporate on-the-job training as part of their curriculum. However, it is important to note the difference between the on-the-job training by construction contractors and the on-the-job training that should be given in training programs. The on-the-job training

offered by the contractors does not generally have any systematic rotation of tasks or formal evaluation of tasks performed and is not complemented by in-class training. The on-the-job training to be developed by vocational educators with input and coordination from the industry must ensure that there is a structured systematic training sequence, that there is a rotation of tasks that a trainee performs, and that there are periodic evaluations of the tasks performed by the trainee in addition to classroom instruction.

5. An increase in wage rates is necessary to attract enough manpower to fulfill the demand. A low wage scale is one of the biggest influences causing graduates to choose an alternative occupation. Manpower and training committees of the construction associations need to determine if contractors are concerned enough with the supply of skilled manpower to increase wage rates.

Recommendations for Future Research

During the course of research for this study, several areas were identified that needed further investigation.

1. Use the methodology and research model developed to examine the discrepancy on a national level to determine the variables associated with the high nationwide industry demand for skilled labor and the low supply from training programs.

2. A survey of vocational-technical and community college students and recent graduates would provide further

insight into student satisfaction with training. A survey could be focused on an individual's ability to compete in the job market with students and graduates of other types of carpentry training programs.

3. An in-depth study to investigate the opinions of carpenters in the field to determine if their views regarding skills and training differ from the opinions expressed by building contractors.

4. The decline in enrollment in building trades training programs throughout Florida must be investigated to determine what recruitement procedures are used and what marketing is used to promote the programs and how this current trend of decreasing enrollment could be reversed.

5. Develop a methodology to link the construction economic activity to placement rate. Research should be conducted to determine the relationship between economic activity and placement.

6. Develop a mechanism for closer interaction, communication, and coordination between the construction industry and the vocational education system.

7. Coordinate the resources available in community colleges and vocational centers with the resources available to construction contractors to enable on-the-job trainees from the industry to take classroom instruction. This could reverse the process to enable community college and vocational center trainees to obtain on-the-job training with construction contractors in the industry.

APPENDIX A
COPY OF QUESTIONNAIRE TO EDUCATORS

1. GENERAL INFORMATION

Name of Educational Institution _____

Contact Person _____ Position _____

Number of students Enrolled 1985/86 _____

86/87 _____ 87/88 _____

Number of Students Graduated 1985/86 _____ 86/87 _____

Number of Students Placed in Employment related to their training 85/86 _____ 86/87 _____

II. RECRUITMENT

	yes	no
1. In your opinion, are the carpentry training programs offered in community colleges and vocational centers fulfilling the demand for trained carpenters?	____	____
2. Is student recruiting adequate?	____	____
3. Are local contractors aware of the existence of your program?	____	____
4. Do they look to your program to supply them with trained carpenters?	____	____
5. Is there a central recruiting office for this community college/voc-tec center?	____	____
6. Does the carpentry program participate in the central recruiting office?	____	____
7. Does the carpentry program conduct its own recruiting?	____	____
8. Do you have a brochure for the program?	____	____

9. What % of the capacity of the program is the number of enrolled students? a. less than 25% b. 25%-50% c. 50%-75% d. over 75%

10. What % of your time is devoted to recruiting? a. less than 5% b. 5-10% c. 10-15% d. over 15%

11. Below, several possible strategies are listed for increasing student enrollment. In your opinion, what is the degree of success for each strategy listed?

4 = extremely successful 2 = partially successful
3 = successful 1 = not successful

	Degree of Success			
a. Encouraging high school students to take courses while completing graduation requirements at their high school	4	3	2	1
b. Advertising the program in local newspapers and journals.	4	3	2	1
c. Instructor takes a mobile carpentry workshop to conduct recruitment sessions in high schools and malls.	4	3	2	1
d. Mass mailings of the program schedule to prospective students.	4	3	2	1
e. Staff members seek opportunities to make recruitment presentations in local high schools.	4	3	2	1
f. Advertisement or flyers sent to parents.	4	3	2	1
g. Development of slide tape presentations for distribution throughout the region.	4	3	2	1
h. Providing tours of the program for prospective students.	4	3	2	1
i. Utilization of local radio and T.V. stations to place public service announcements about the training program.	4	3	2	1
j. Allow students to enroll part time in the training program.	4	3	2	1
k. Staff takes past and present students to feeder schools to provide honest, realistic information regarding the training program.	4	3	2	1
l. Utilizing advisory committee activities in the recruitment process.	4	3	2	1

12. A shortage of skilled carpenters is projected for the coming years in Florida. Do you agree with this?
Yes _____ No _____

III. PLACEMENT

	yes	no
13. Is there a placement center at this community college/Vocation-Technical Center?	____	____
14. Is there a placement center in the department that houses the carpentry program?	____	____

15. Does the carpentry program have a placement officer? ____ ____

16. In your opinion which of the following factors had the most influence on the placement of your graduates in jobs related to their training?

Please use a scale of 1 to 10: 10 = extremely influential 1 = no influence

		Rank
a.	Counseling students on job opportunities and requirements.	____
b.	The quality and adequacy of training provided to the students.	____
c.	Students had previous on-site experience.	____
d.	Existence of an advisory or craft committee for the program.	____
e.	The central placement center for the Voc-Tech/Community College.	____
f.	An individual effort and personnel contacts of the instructor.	____
g.	Cooperation between instructor and placement officer.	____
h.	Help from students' friends and relatives to get job contacts.	____
i.	Relationship between program personnel and local contractors.	____
j.	Providing information on local employment opportunities.	____
k.	Actively contacting contractors and inviting them to visit the program and interview the students.	____
l.	Showing up at construction jobs and asking for work.	____

17. In your opinion what one factor had most effect on the placement of your graduates?

_____

_____

_____

18. What is the average hourly wage of an individual who has just graduated from your carpentry program? _____

19. In your view, what percentage of graduates of carpentry training programs are seeking an alternative occupation? _____ %

20. In your opinion, which of the following factors has most influence in causing graduates of carpentry training programs to seek an alternative occupation:

Please use a scale of 1 to 10 10 = very important reason 1 = no reason at all

Rank

____ a) Low wage rates.
____ b) Characteristics and conditions of the job.
____ c) Students preference.
____ d) Students feel they have not acquired the training necessary to perform on the job.
____ e) No jobs available for carpenters in the area.

IV. TRAINING AND COMMUNICATION

21. Below are a list of various skills which a journeyman carpenter might possess. Please circle the number which in your opinion, students of carpentry training programs should possess at the completion of their training. Use the following rating system:

4 = absolutely necessary 3 = necessary 2 = desirable
1 = unnecessary

a. Read blueprints	4	3	2	1
b. Conduct site preparation and layouts	4	3	2	1
c. Preplan forthcomming activities	4	3	2	1
d. Construction forms (footing, walls, edge, curb)	4	3	2	1
e. Construction forms (piers, columns, beams, slabs, stairs, bridge, deck)	4	3	2	1
f. Frame floor and sills	4	3	2	1
g. Frame partitions	4	3	2	1
h. Frame roofs	4	3	2	1
i. Build trusses	4	3	2	1
j. Install structural timber	4	3	2	1
k. Install decking and sheathing	4	3	2	1
l. Install exterior wall covering and trim	4	3	2	1
m. Apply weather stripping and caulking	4	3	2	1
n. Install door, window frame and units	4	3	2	1
o. Install drywall material	4	3	2	1
p. Construct interior stairs	4	3	2	1
q. Install cabinets, fixtures and shelving	4	3	2	1
r. Install paneling, furring, soffit ceiling	4	3	2	1
s. Install insulation and sound control material	4	3	2	1
t. Issue instructions to crew members	4	3	2	1

22. To what degree do you feel that specialization has entered the field of carpentry?
Please circle one of the following:
4 = large degree 3 = some degree 2 = small degree 1= no degree

23. Will the future carpenter be performing a broader variety of tasks? Use the following rating system?

4 = much broader 3 = broader 2 = no change 1 = narrower

framing carpenters	4	3	2	1
form carpenters	4	3	2	1
finish carpenters	4	3	2	1
other _____	4	3	2	1

24. In your opinion, would there be better skilled carpenters if they were required to be licensed?

Yes _____ No ____ Why? _____

_____

25. Rank (1, 2, 3, 4; 4 being the most important) the following as to the best method of establishing an education/industry linkage

Formal meeting of the two groups	4	3	2	1
Advisory committee	4	3	2	1
Attending industry functions	4	3	2	1
Written contact	4	3	2	1
Other _____	4	3	2	1

26. In your opinion, what one factor could provide more effective involvement with the construction industry and provide carpentry programs with a closer working relationship with industry?

_____

_____

27. What level of communication do you have with the following institutions?
Choose one of the choices using the following scale:
4 = very close 3 = close 2 = remote 1= very remote

a. Construction industry (contractors, generally)	4	3	2	1
b. Florida Home Builders	4	3	2	1
c. Association of General Contractors (AGC)	4	3	2	1
d. Associated Builders and Contractors (ABC)	4	3	2	1
e. Union Brotherhood of Carpenters	4	3	2	1

APPENDIX B
COPY OF QUESTIONNAIRE TO INDUSTRY

QUESTIONNAIRE

Name of firm _____

Contact person _____ Position _____ Phone _____

Annual Volume of Business in Dollars _____

Type of Construction Undertaken: Residential _____ %

Commercial _____ % Others: _____ %

Type of Operation: Open Shop _____ Union _____ Both _____

Number of Projects carried per year _____

Answer the following as yes, no, or cannot say.

	Yes	No	Cannot Say
1. Are there enough skilled carpenters for you to hire?	____	____	____
2. Do you feel there is a need for more skilled carpenters in commercial construction?	____	____	____
3. Do you think that carpenters working in commercial construction need to undergo some classroom training program?	____	____	____

4. How many workers do you have on your payroll drawing journeyman carpenter wages?
5. Of these workers earning journeyman carpenter wages, how many are skilled carpenters? _____

6. How many apprentices or carpenters-in-training do you have on your payroll? _____

7. In your opinion, which of the following tasks must a "skilled carpenter" be able to perform proficiently?

Use the following scale: 4. Absolutely necessary 3. Necessary 2. Desirable 1. Unnecessary

a.	Read blueprints	4	3	2	1
b.	Conduct site preparation and layouts	4	3	2	1
c.	Preplan forthcomming activities	4	3	2	1
d.	Construction forms (footing, walls, edge, curb)	4	3	2	1
e.	Construction forms (piers, columns, beams, slabs, stairs, bridge, deck)	4	3	2	1
f.	Frame floor and sills	4	3	2	1
g.	Frame partitions	4	3	2	1
h.	Frame roofs	4	3	2	1
i.	Build trusses	4	3	2	1
j.	Install structural timber	4	3	2	1
k.	Install decking and sheathing	4	3	2	1
l.	Install exterior wall covering and trim	4	3	2	1
m.	Apply weather stripping and caulking	4	3	2	1
n.	Install door, window frame and units	4	3	2	1
o.	Install drywall material	4	3	2	1
p.	Construct interior stairs	4	3	2	1
q.	Install cabinets, fixtures and shelving	4	3	2	1
r.	Install paneling, furring, soffit ceiling	4	3	2	1
s.	Install insulation and sound control material	4	3	2	1
t.	Issue instructions to crew members	4	3	2	1
u.	Other _____				

8. What is the average hourly wage paid by your firm to the following?

Journeyman carpenter $ ____ Apprentice (carpenter-in-training) $ ____

9. How long, on the average, do the carpenters stay in your employment? (answer in months) Journeyman carpenter _____ apprentice (carpenter-in-training) ____

	yes	no	cannot say
10. Would you bid more jobs or increase the volume of your business	____	____	____

11. Have you ever, in the past year, paid overtime to skilled carpenters because of any shortage in the market? ____ ____ ____

12. Would you hire more skilled carpenters to avoid paying overtime? ____ ____ ____

13. What percentage of hours worked by carpenters is overtime? Please estimate. ____ ____ ____

Answer questions number 14 to 18 if you sub-contract any of the carpentry work, otherwise skip to question 19.

14. What percentage of carpentry work do you subcontract? _____ %

15. If you sub-contract a majority of your carpentry work, are there enough firms available to do your work? ____ ____ ____

16. Are you satisfied with the quality of the work done by the firms to whom you sub-contract carpentry work? ____ ____ ____

17. In your opinion, is the skill of the carpenters who work on the sub-contracted work adequate? ____ ____ ____

18. In your opinion, what percentage of the sub-contractor's carpenters are skilled carpenters? _____ %

19. Where do you search for carpenters?
Use the following scale: 4. Always 3. Most of the time
2. Sometimes 1. Never

a.	Labor agents	4	3	2	1
b.	Labor unions	4	3	2	1
c.	Vocational training centers	4	3	2	1
d.	Union apprenticeship programs	4	3	2	1
e.	Open-shop apprenticeship programs	4	3	2	1
f.	Advertisements in the parers	4	3	2	1
g.	Contacts in the construction industry	4	3	2	1
h.	Other construction jobs	4	3	2	1
i.	Company on-the-job training	4	3	2	1
j.	Community college training programs	4	3	2	1

20. Are the following training programs making any substantial contributions in supplying skilled carpenters to the residential construction industry?

    Use the following scale: 4. To a large extent 3. To some extent 2. To a small extent 1. Negligible

a.	Vocational training centers	4	3	2	1
b.	Union apprenticeship programs	4	3	2	1
c.	Open shop apprenticeship programs	4	3	2	1
d.	Community College training	4	3	2	1
e.	On-the-job training	4	3	2	1

21. Will the future carpenter be performing a broader variety of tasks? Use the following rating system:
    4 = much broader 3 = broader 2 = no change
    1 = narrower

a.	framing carpenters	4	3	2	1
b.	form carpenters	4	3	2	1
c.	finish carpenters	4	3	2	1
d.	other _____	4	3	2	1

22. In your opinion, are the following training programs making any substantial contributions in producing the best carpenters for your needs?
    (rank 1 - 4; 4 being best and 1 being the worst)

a.	Vocational training centers	4	3	2	1
b.	Union apprenticeship programs	4	3	2	1
c.	Open shop apprenticeship programs	4	3	2	1
d.	Community college training	4	3	2	1
e.	On-the-job training	4	3	2	1

23. What criteria determines promotion or an increase in wages of a carpenter in your company?
    Use the following scale: 4. Always 3. Most of the time
    2. Sometimes 1. Never

a.	Graduation from training program	4	3	2	1
b.	Performance	4	3	2	1
c.	Experience	4	3	2	1
d.	Seniority	4	3	2	1
e.	Market wage rate	4	3	2	1

	yes	no	cannot say
24. In your opinion, should the carpenter be required to have a license to insure better skills and standards?	____	____	____

25. From your experience, do you believe that illegal aliens are being hired by other construction firms? ____ ____ ____

26. In your opinion, what percentage of the carpenters in Florida are illegal aliens? _____ %

27. In your view, is the shortage of skilled carpenters due to: Use the following scale:
4. very important reason 3. important reason 2. could be the reason 1. not a reason at all

a. Lack of training programs	4	3	2	1
b. Low wage rates	4	3	2	1
c. Part time carpenters	4	3	2	1
d. More emphasis on cutting cost than quality control	4	3	2	1
e. Construction boom	4	3	2	1
g. Low profile of labor unions	4	3	2	1
h. General decline in craftsmanship	4	3	2	1
i. Because there is greater emphasis on factory built components (trusses etc.) there is a decreased demand in the skills level of on site carpenters	4	3	2	1
j. Others _____	4	3	2	1

28. What would you suggest to help solve the shortage of skilled carpenters?

_____
_____
_____

29. Rank (1, 2, 3, 4 ; 4 being the most important) the following as the best method of establishing an Industry/Training program linkage.

a. Formal meeting of the two groups	4	3	2	1
b. Sitting on an advisory committee	4	3	2	1
c. Attending educational functions	4	3	2	1
d. Written contact	4	3	2	1
e. Others (please specify) _____	4	3	2	1

30. In your opinion, what one factor could provide more effective involvement with training programs for a closer working relationship?

_____
_____
_____

31. What level of communications do you have with the following training programs?
Use the following scale: 4. very close 3. close 2. remote 1. very remote

a. Vocational training centers	4	3	2	1
b. Union apprenticeship programs	4	3	2	1
c. Open shop apprenticeship programs	4	3	2	1
d. Community college training	4	3	2	1
e. On-the-job training	4	3	2	1

32. Has a shortage of carpenters ever directly caused you scheduling problems?
Yes _____ No _____

APPENDIX C
COVER LETTERS: DIRECTOR, SCHOOL OF BUILDING CONSTRUCTION

SCHOOL OF BUILDING CONSTRUCTION
UNIVERSITY OF FLORIDA
GAINESVILLE, 32611

PHONE 904 392-5965
904 392-0202
SUNCOM 622-0202

September 9, 1987

Dear Educator:

In cooperation with the Building Construction Industry Advisory Committee, the School of Building Construction at the University of Florida is conducting a study concerning Community College and Vocational Center training programs. Specifically, to determine whether skilled carpenters are being trained in sufficient numbers to fulfill the needs of the industry, and to identify the most productive recruiting practices utilized to reach those numbers. We also want to find out which placement methods are most effective in obtaining jobs for your graduates.

Your cooperation will be of great benefit to us as well as the construction industry. Please take a few minutes of your valuable time to fill out the attached questionnaire and return it in the enclosed self addressed stamped envelope. If you have any questions concerning this study or the questionnaire please contact Ali Markus at 904-392-6755. Thank you for your consideration.

Sincerely,

Brisbane H. Brown, Jr.
Professor

BHB:clm

SCHOOL OF BUILDING CONSTRUCTION
UNIVERSITY OF FLORIDA
GAINESVILLE, 32611

PHONE 904 392-5965
904 392-0202
SUNCOM 622-0202

June 28, 1987

Dear Contractor:

In cooperation with the Building Construction Industry Advisory Committee, the School of Building Construction at the University of Florida is conducting a study to determine whether skilled carpenters are being trained in sufficient numbers to fulfill your needs. We also want to find out what hiring methods are most effective in obtaining skilled carpenters.

Your cooperation will be of great benefit to us as well as the construction industry. Please take a few minutes of your valuable time to fill out the attached questionnaire and return it in the enclosed self addressed stamped envelope. If you have any questions concerning this study or the questionnaire please contact Ali Markus at (904) 392-6755. Thank you for your consideration.

Sincerely,

Brisbane H. Brown, Jr.
Professor and Director

BHB:jh

Enclosure

APPENDIX D
COVER LETTER: DIVISION OF VOCATIONAL, ADULT, AND COMMUNITY EDUCATION

FLORIDA DEPARTMENT OF EDUCATION
Betty Castor
Commissioner of Education

July 28, 1987

Dear Vocational Educator:

The School of Building Construction at the University of Florida is conducting a study of the opportunities and impediments affecting the recruitment, training, and employment of construction carpenters in Florida. This comprehensive undertaking will provide valuable insights into the upgrading and improvement of our state construction trades programs. Several associations such as Associated Builders and Contractors, Associated General Contractors, Florida Home Builders, and unions have already provided their input with almost 100% participation.

Please take a few moments to complete the attached questionnaire as it is vital to completion of the data collection effort. We at the Florida Department of Education fully endorse this activity as it promises to provide a basis for significantly improved program support.

If you have questions or concerns, please feel free to contact this office. Again, your cooperation is greatly appreciated.

Sincerely,

Talmadge V. Rushing
Director, Industrial Education

TLR:lv

Attachment

APPENDIX E
COVER LETTER: ASSOCIATED BUILDERS AND CONTRACTORS

July 10, 1987

MEMO

TO: ABC Member Contractor

FROM: Fred Powell, Director of Education
ABC National Staff

RE: University of Florida, School of Building Construction
Carpentry Survey

Associated Builders & Contractors has recently been approached by the University of Florida- School of Building Construction and the Building Construction Industry Advisory Committee to assist them with conducting a study to determine what hiring methods are most effective in obtaining skilled carpenters. This study is also to discover whether skilled carpenters are being trained in sufficient numbers to meet the needs of today's construction industry.

As you may already know, your valuable input today is necessary to determine the trends and shape of our industry tomorrow. Please take some time to fill out the enclosed questionnaire and return in the enclosed self addressed stamped envelope. If you have any questions concerning this study or the questionnaire please direct them to Ali Markus at (904) 392-6755. Thank you for your time and expertise.

APPENDIX F
COVER LETTER: ASSOCIATED GENERAL CONTRACTORS OF AMERICA

-phone (813) 888-6687 4509 W. George Road • P.O. Box 22646, Tampa, Florida 33622

July 6, 1987

TO: SELECTED AGC MEMBERS

FROM: CLAY MCCULLOH

The Building Construction Industry Advisory Committee and The School of Building Construction at the University of Florida are conducting the enclosed study.

The AGC of Mid-Florida has agreed to assist in the study and encourage those selected members to participate. We feel the results of this study will be of great benefit to AGC's training and job placement efforts.

Thank you for your assistance.

Yours truly,

Clay

Clay McCulloh
Executive Vice President

APPENDIX G
COVER LETTER: UNION BROTHERHOOD OF CARPENTERS

United Brotherhood of Carpenters and Joiners of America

Office
101 Constitution Ave., N. W.
Washington, D. C. 20001

E. Jimmy Jones
Member General Executive Board
Fourth District

District Office
American Bank Building
16300 N.E. 19th Ave., Suite 220
North Miami Beach, FL 33162
305/940-8818-44

June 9, 1987

Dear Union Contractor:

Enclosed you will find a letter dated June 4, 1987 from Brisbane H. Brown, Professor and Director of the School of Building Construction at the University of Florida in Gainsville, Florida 32611. Professor Brown requests that you fill out the enclosed Questionnaire.

Several days ago it was brought to my attention that he was not getting enough responses from the Union Contractors to complete his study. I sent one of my Representatives to meet with the Professor and to report back to me his findings. He was received cordially and furnished with the Questionnaire and envelopes for your reply.

I urge all Union Contractors to complete the Questionnaire and send it back in the enclosed addressed envelope.

Thank you for your cooperation.

Fraternally yours,

E. Jimmy Jones

E. Jimmy Jones,
4th District Board Member

EJJ/jp
Enclosures

APPENDIX H
COVER LETTER: FLORIDA HOME BUILDERS

Florida Home Builders Association • P.O. Box 1259 • Tallahassee, Florida 32302-1259 • Phone (904) 224-4316

MEMORANDUM

TO: FHBA Builder Members

FROM: Susan Yarbrough, Director of Governmental Affairs

DATE: March 31, 1987

SUBJECT: School of Building Construction, University of Florida Survey

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Attached is a request by the School of Building Construction to provide data they need to determine the overall state needs for skilled laborers, specifically carpenters.

I urge each of you to take the time to provide the information requested, as the results could benefit our entire industry.

SJL/sc

Attachment

APPENDIX I
FLORIDA'S FIVE MARKET REGIONS

APPENDIX J
LOCATIONS AND NAMES OF CARPENTRY PROGRAMS

VOC-TECH PROGRAMS:

1. Atlantic Vocational Center
   Coconut Creek

2. Bay Area Voc-Tech Center
   Ft. Walton Beach

3. Bradford Union Voc-Tech Center
   Starke

4. Broward County Voc-Tech and Adult Education Center
   Ft. Lauderdale

5. Charlotte Voc-Tech and Center
   port Charlotte

6. Crestview Voc-Tech Center
   Crestview

7. Erwin Area Voc-Tech Center
   Tampa

8. George Stone Voc-Tech Center
   Pensacola

9. Lake County Area Voc-Tech Center
   Eustis

10. Lee County Area Voc-Tech Center
    Ft. Myers

11. Lewis M. Lively Voc-Tech Center
    Tallahassee

12. Lackin Voc-Tech Center
    Milton

13. Manatee Area Voc-Tech Center
    Bradenton

14. Maynard E. Traviss Voc-Tech Center
    Eaton Park

15. Pinellas Voc-Tech Institute
    Clearwater

16. Ridge Voc-Tech Center
    North Winter Haven

17. Sarasota County Vocational Center
    Sarasota

18. Seminole Vocational Education Center
    Seminole

19. South Florida Carpenters Apprenticeship Training Center
    Miami

20. South side Skill Center
    Jacksonville

21. St. Augustine Tech Center
    St. Augustine

22. St. Petersburg Voc-Tech Institute
    St. Petersburg

23. Suwannee Hamilton Voc-Tech Center
    Live Oak

24. Tampa Bay Area Voc-Tech Center
    Tampa

25. Taylor County AVTC/General Adult Education Center
    Perry

26. Tom P. Haney Voc-Tech Center
    Panama City

27. Westside Voc-Tech Center
    Winter Garden

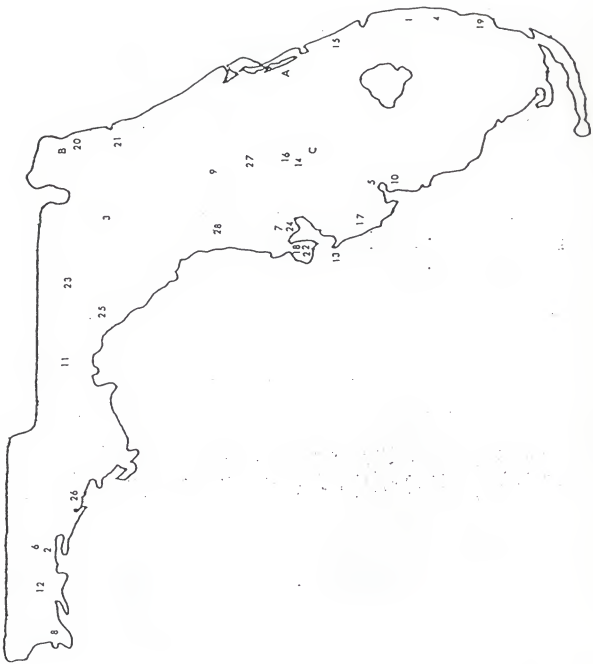
28. Withlachoochee Vocational Adult Education Center
    Inverness

COMMUNITY COLLEGE PROGRAMS:

A. Brevard Community College
   Cocoa

B. Florida Junior College at Jacksonville
   Jacksonville

C. South Florida Community College
   Avon Park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REFERENCES

Agresti, A., & Agresti, B. F. (1981). Statistical methods for the social sciences. San Francisco: Dellen.

Ahmann, S.J. (1979). Needs assessment for program planning in vocational education. Columbus, OH: National Center for Research.

Associated General Contractors of America. (1986). Blueprint for training. Washington, DC: AGC Manpower Training services.

Bottoms, G. (1983). Flexibility is the key to growth. Vocational Education, 58, 10-11.

Bottoms, G., & Copa, P. (1983). A perspective on education today. Phi Delta Kappan, 64, 348-354.

Brown, D., & Feit, S. (1978). Making job placement work. Vocational Guidance Quarterly, 10, 176-183.

Business Round Table. (1983a). Construction training through vocational education (a construction industry cost effectiveness project report D-3). New York: Author.

Business Round Table. (1983b). Governmental limitation on training innovations (a construction industry cost effectiveness project report D-2). New York: Author

Business Round Table. (1983c). Labor supply information (a construction industry cost effectiveness project report D-5). New York: Author.

Carvel, F., Carvel, J.B., Holzkamper, C., & Vann,L. (1980). A community college educator's guidebook for non-tradional vocational program improvement. Los Angeles, Ca: Carvell Education Management Planning Inc.(ERIC Document Reproduction Service No. ED 192 824)

Casterline, L.E (1974). The effects of training plans on the perceptions of distributive education as a training program. Dissertation Abstracts International 35, 7187A (University Microfilms No. 75-11, 326, 144)

Churchill, R.C., Jr. (1983). An industry/vocational technical education linkage model to facilitate curriculum development and revision in ornamental horticulture (Doctoral Dissertation, University of Florida, 1983). Dissertation Abstracts International, 44, 7A.

Clark, D., & Rinehart, R. (1982, July). Structures and strategies for linking the higher education and employment opportunities. Higher Education, pp. 1-9.

Cobb, R. B., & Kingsbury, D. E. (1985, May). The special provisions of the Perkins Act. Voc Ed, pp. 33-34. Construction Labor Research Council (1985). Meeting the future need for construction labor 1990-1995. Washington, DC: Author.

Conner, D. (1986). Toward the year 2000. Tallahasse, FL: Florida Department of Education.

Dailey, J.M. (1964). Skill utilization and its impact upon apprenticeship programs in the homebuilding industry. Dissertation Abstracts International, 25, 10 (University Microfilms No. 65-04,105)

Davis, E. L. (1977). An investigation of Georgia's distributive education and vocational office training programs in terms of the high school principal's perceptions. Dissertation Abstracts International, 41, 22A. (University Microfilms No. 77-27, 937,76)

Devencey, S.J. (1982). A competency based postsecondary model for building trades in Colorado. Dissertation Abstracts International, 44, 02A. (University Microfilms No. 83-13,9741)

Drewes, D.N., & Bice, G.R. (1981). Occupational information and vocational education: A concept paper. Charlotte, NC: Research Triangle Institute.

Dunbar, E. M. (1988). Education and manpower Builder and Contractor. 36(3), 28-35.

Ehrenberg, G., & Smith, A. (1985). Modern labor economics (2nd ed). Glenview, IL: Scott, Foresman.

Flannagan, T. (1974). Whatever happened to job placement? Vocational Guidance Quarterly, 5 209-213.

Florida Department of Education. (1979). A place for a uniform coordinated system for vocational education. Tallahassee, FL: Author.

Florida Department of Education. (1986). Follow up survey 1985-86. Tallahassee, FL: Author.

Florida Department of Education. (1987). Final report spring 1987. Tallahassee, FL: Author.

Florida Division of Vocational, Adult, and Community Education. (1986). Vocational education program course standards: Industrial education. Tallahassee, FL: State of Florida, Department of Education.

Florida School Laws. (1985). (Chapter 226-246. Florida Statutes). Tallahassee, FL: Florida Department of Education.

Florida State Advisory Council for Vocational Education (1984a). Annual evaluation report for FY 1984. Tallahassee, FL: Florida Department of Education.

Florida State Advisory Council on Vocational and Technical Education. (1984b). Business, industry and labor perception of state supported linkages. Tallahassee, FL: Florida Department of Education.

Flordia State Advisory Council on Vocational and Technical Education. (1984c). Vocational job prepartory student placement and follow up in Florida. Tallahassee, FL: Florida Department of Education.

Florida statistical abstract. (1986). Gainesville, FL: Bureau of Economic and Business Research, University of Florida.

Freeman, R.B. (1977). The market for college trained manpower. Cambridge, MA: Harvard University Press.

Foster, M.G. (1973). Manpower in homebuilding: A preliminary analysis. Philadelphia, PA: University of Pennsylvania, The Wharton School Industrial Research Unit.

Gardner, J.W. (1961). Excellence: Can we be equal and excellent too. New York: Harper and Row.

Goldstein, H. (1983). Future labor market demand and vocational education. Tallahassee, FL: National Institute of Education.

Houseman, A.E. (1908). A Shropshire lad. New York: Mitchell Kennerley.

Huck, S.W., Cormier, W.H., & Bounds, W.A. (1976). Reading statistics and research. New York: Holt, Rinehart and Winston.

Issac, A.B. (1986, April 24). Building trades fight back, Engineering News Record, pp. 63-65.

Keppel, G. (1982). Design and analysis: A researcher's handbook. Englewood Cliffs, NJ: Prentice-Hall.

Kerlinger, F.N. (1973). Foundations of behavioral research (2nd ed.). New York: Holt, Rinehart and Winston.

Kosmo, S.J. (1978). History of contemporary placement services. Madison. WI: Wisconsin vocational studies center, University of Wisconsin.

Lovelace, J., & White, B. (1982). A review of planning and evaluation literature. Tallahassee, FL: Florida Department of Education.

Massoudi, A. (1984). Factors which influence the placement of postsecondary students Who completed machine shop programs in Florida's vocational technical schools (Doctoral Dissertation, Florida State University, 1984). Dissertation Abstracts International, 47, 01A.

Maurice, C. (1985). The validity and effectiveness of labor market data for planning vocational education and employment and training programs. Tallahassee, FL: Florida State University.

Mckinney, F.L., & Malasz-Salster, I. (1981, April). Factors affecting job placement of former secondary vocational education students. Paper presented at the annual Meeting of the American Education Research Association, Los Angeles, CA.

Mitchell, M.H., & Gibson, R.L. (1977). Job placement fact or fiction? American Vocational Journal, 52, 39-41.

Morrison, E. J. (1976). National assessment of vocational education needs. Columbus, OH: National Center for Research in Vocational Education. Ohio State University.

Nuntz, A. R., & Russell, J.F. (1981). Manufacturers' views of vocational education. Columbus, OH: Ohio State University.

Parks, D., & Henderson, G.H. (1985, May). Strengthening the academic foundations of vocational education. Voc Ed., pp. 34-36.

Polvika, L., & Harrison, C. (1982). Vocational education study final report. Tallahassee, FL: Florida Department of Education.

Preskill, H.P. (1984, March). Why we must study history and philosophy. Voc Ed., p. 16.

Provus, M. (1971). Discrepancy evaluation for educational program improvement and assessment. Berkeley, CA: McCutchan Publishing Corporation.

Pucel, D.J. (1973). Rationale and methods, the Minnesota vocational follow-up system. St. Paul, MN: Merrill.

Redington, R.F. (1971, September). Public relations in distributive education. Balance Sheet, pp. 18-19.

Richardson, W., & McFadden, J.R. (1977). Employment patterns and earnings of secondary vocational graduates. Washington, DC: Mainstream Inc.

Schultz, R. R., & Stronge, W.B., (1981). Study of vocational education as viewed by business and industry. Tallahassee, FL: Florida Department of Education.

Setzer, S.W. (1986). Labor shortages grip several cities. Engineering News Record, 25 (217), 10-11.

Sherman, S.W. (1983). Education for tomorrow's jobs. Washington: National Academy Press.

Stake, E. R. (1967). The countenance of educational evaluation. Teachers College Record, 68, 523-540.

Stufflebeam, D., Foley, W., Gephart, W., Guba, E., Hammond, R., Meriman, H., & Provus, H. (1971). Educational evaluation and decision making. Phi Delta Kappa National Study Committee on Evaluation. Itasca, ILL: F.E Peackock

Terry, D.R. (1985, May). The adult learner and the Perkins Act. Voc Ed., pp. 31-32

U.S Department of Labor. Bureau of labor statistics. (1980). Annual construction industry report. Washington, DC: Author

U.S Department of Labor. Bureau of Labor statistics. (1986). Occupational outlook handbook. Washington, DC: Author

BIOGRAPHICAL SKETCH

Ali Milud Markus was born in Banghazi, Libya, on December 31, 1953, to Milud and Sultana Markus, into a family consisting now of seven daughters and two sons. He attended Tripoli College, a British school, for his primary and secondary education in Tripoli, Libya.

He received an Ordinary National Diploma in Building from Hastings College of Further Education, Sussex, England, in 1974. He went on to attend Brighton Polytechnic in Sussex, England, and was awarded a Bachelor of Science in Building in 1978.

He held several positions as a civil and project engineer with the International Consultant Engineers of Howard Humphries and Sons in Surrey, England; with the East Sussex County Council in Lewis, England; and with The Libyan National Construction Company.

He came to the United States in 1981. Here he entered the graduate program in the School of Building Construction at the University of Florida, where he attained the Master of Building Construction degree in 1982.

He returned to his country, Libya, where he was awarded a scholarship from Tripoli University to pursue doctoral

studies in the U.S. He returned to the University of Florida in 1984 and since that time has worked towards completion of the requirements for the degree of Doctor of Philosophy in a joint program between the College of Education and the School of Building Construction.

He married Nadia Aledrisi in July, 1983, and they have two children, Nibal and Mohamed, born in Gainesville while he was pursuing his doctoral studies.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James W. Hensel, Chairman
Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Brisbane H. Brown,
Cochairman
Professor of Building Construction

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

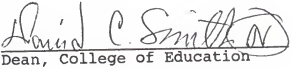
Rodney E. Cox
Professor of Building Construction

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Albert B. Smith
Professor of Educational Leadership

This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August, 1988



Dean, College of Education

Dean, Graduate School